PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-112673

(43)Date of publication of application : 21.04.2000

(51)Int.Cl. G06F 3/06

G11B 7/004

G11B 7/005

G11B 20/10

G11B 20/12

(21)Application number : 10-292823

(22)Date of filing : 30.09.1998

(71)Applicant : TOSHIBA CORP

(72)Inventor : ANDO HIDEO

ITO SEIGO

(54) METHOD AND DEVICE FOR RECORDING INFORMATION TO INFORMATION STORAGE MEDIUM, AND REPRODUCING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To stably perform continuously recording without being affected by many defective areas on an information recording medium even in such a case by setting a logical address for a defective area on the information recording medium, and also dividing the defective area and setting extents.

SOLUTION: On the information storage medium, information is recorded by files and a continuous data area which is a continuous recording area for lowering the access frequency of an optical head and enabling continuously recording to the information storage medium is defined. This contiguous data area is set across another file recording area which is already recorded on the information storage medium or a defective area on the information storage medium. Then an extent as an information recording location is set for the other file area or the area divided by the defective area on the

information storage medium.

CLAIMS

[Claim(s)]

[Claim 1]When the Information Storage Division place is set up to an information storage medium in which record reproduction of information is possible, A physical address (PSN) which makes the 1st field a field which can record information to said information storage medium at the time of use, and shows a physical position on an information storage medium to this 1st field, Set up a logical address (LBN) for managing logically information recorded on said information storage medium, and. Are the unit on which information was recorded succeeding said logical address space top, and a unit to which a continuous logical address number (LBN) is given is defined as the extent (Extent) in this unit, Although it enables it to record information in a unit of said extent and the above-mentioned logical address number is given also to a defect region generated in a field (User Area) of the above 1st on said information storage medium, An Information Storage Division method for an information storage medium, wherein a place where the above-mentioned extent was divided and said information was recorded forms an extent for Information Storage Division between a place where information is recorded, and said defect region.

[Claim 2]Skipping replacement (Skipping Replacement) processing which is a method which avoids a defect region on an information storage medium, and is recorded from the next when recording information is performed, An Information Storage Division method for the information storage medium according to claim 1 dividing between the above-mentioned defect regions and setting up the extent (Extent) after an end of record.

[Claim 3]An optical head which is the Information Storage Division regeneration method which performs record reproduction of information to an information storage medium using a converged beam, and irradiates with a converged beam to said information storage medium, It is the Information Storage Division method which records information on an information storage medium using an optical head moving mechanism to which said optical head is moved to an information storage medium, and a control section which controls movement of said optical head, Record information by a file basis which is the 1st unit for recording information on said information storage medium, and. Contiguous-data-area (Contiguous Data Area) which is a continuous recording field for reducing access frequency of an optical head, having it and making

possible continuous recording to said information storage medium is defined as the 2nd unit, And record per said contiguous-data-area (Contiguous Data Area), and, moreover, said file basis is constituted as an aggregate of said contiguous-data-area (Contiguous Data Area) unit, And straddle in either one of another file record section already recorded on said information storage medium at least, or a defect region on an information storage medium, and said contiguous-data-area (ContiguousData Area) unit is set up. An Information Storage Division method for an information storage medium having set up the Information Storage Division place.

[Claim 4]The size CDAS of said contiguous data area is CDAS >=STR x PTR x(Ta+Tskip+Tpc)/(PTR-STR).

However, 1 time of the average access time and Tskip to which an average system transfer rate accesses STR, a physical transfer rate accesses PTR, and a reading means accesses a record section on an information storage medium to Ta, Total time and Tpc which pass through an inclusive sum part of a defect region for which the first skipping processing to discover in contiguous data area this time at the time of record is needed, An Information Storage Division method for the information storage medium according to claim 3 setting up become sum total access time required in order to avoid a defect region which carried out skipping replacement processing linear replacement processing or last time before with existing another file at the time of record.

[Claim 5]Total size Lskip of another file record section and a defect region contained in one contiguous data area, Lskip <={[CDASx(PTR-STR)/(STRxPTR)]-Ta-Tpc} xPTR -- however, As for PTR, an average system transfer rate and Ta a physical transfer rate and STR 1 time of the average access time, CDAS Size of contiguous data area, An Information Storage Division method for the information storage medium according to claim 3 setting up Tpc become synthetic access time required in order to avoid a defect region which carried out linear replacement processing before with another file in contiguous data area.

[Claim 6]When the Information Storage Division place is set up to an information storage medium in which record reproduction of information is possible, A physical address (PSN) which makes the 1st field a field which can record information to said information storage medium at the time of use, and shows a physical position on an information storage medium to this 1st field, Set up a logical address (LBN) for managing logically information recorded on said information storage medium, and. Are the unit on which information was recorded succeeding said logical address space top, and a unit to which a continuous logical address number (LBN) is given is defined as the extent (Extent) in this unit, Although it enables it to record information in a unit of said

extent and the above-mentioned logical address number is given also to a defect region generated in a field (User Area) of the above 1st on said information storage medium, The Information Storage Division device to an information storage medium, wherein a place where the above-mentioned extent was divided and said information was recorded forms an extent for Information Storage Division between a place where information is recorded, and said defect region.

[Claim 7]An optical head which is Information Storage Division playback equipment which performs record reproduction of information to an information storage medium using a converged beam, and irradiates with a converged beam to said information storage medium, It is the Information Storage Division device which records information on an information storage medium using an optical head moving mechanism to which said optical head is moved to an information storage medium, and a control section which controls movement of said optical head, Record information by a file basis which is the 1st unit for recording information on said information storage medium, and. Contiguous-data-area (Contiguous Data Area) which is a continuous recording field for reducing access frequency of an optical head, having it and making possible continuous recording to said information storage medium gives a definition as the 2nd unit, And record per said contiguous-data-area (Contiguous Data Area), and, moreover, said file basis is constituted as an aggregate of said contiguous-data-area (Contiguous Data Area) unit, And straddle in either one of another file record section already recorded on said information storage medium at least, or a defect region on an information storage medium, and said contiguous-data-area (Contiguous Data Area) unit is set up. The Information Storage Division device to an information storage medium having a means to set up the Information Storage Division place.

[Claim 8]When the Information Storage Division place is set up to an information storage medium in which record reproduction of information is possible, A physical address (PSN) which makes the 1st field a field which can record information to said information storage medium at the time of use, and shows a physical position on an information storage medium to this 1st field, Set up a logical address (LBN) for managing logically information recorded on said information storage medium, and. Are the unit on which information was recorded succeeding said logical address space top, and a unit to which a continuous logical address number (LBN) is given is defined as the extent (Extent) in this unit, Although it enables it to record information in a unit of said extent and the above-mentioned logical address number is given also to a defect region generated in a field (User Area) of the above 1st on said information storage medium, An information storage medium, wherein a place where the above-mentioned extent

was divided and said information was recorded forms an extent for Information Storage Division between a place where information is recorded, and said defect region.
[Claim 9]An optical head which is Information Storage Division playback equipment which performs record reproduction of information to an information storage medium using a converged beam, and irradiates with a converged beam to said information storage medium, It is an information recording medium which has information recorded by information storage medium using an optical head moving mechanism to which said optical head is moved to an information storage medium, and a control section which controls movement of said optical head, Record information by a file basis which is the 1st unit for recording information on said information storage medium, and. Contiguous-data-area (Contiguous Data Area) which is a continuous recording field for reducing access frequency of an optical head, having it and making possible continuous recording to said information storage medium gives a definition as the 2nd unit, And record per said contiguous-data-area (Contiguous Data Area), and, moreover, said file basis is constituted as an aggregate of said contiguous-data-area (Contiguous Data Area) unit, And straddle in either one of another file record section already recorded on said information storage medium at least, or a defect region on an information storage medium, and said contiguous-data-area (Contiguous Data Area) unit is set up. An information storage medium having set up the Information Storage Division place.
[Claim 10]When the Information Storage Division place is set up to an information storage medium in which record reproduction of information is possible, A physical address (PSN) which makes the 1st field a field which can record information to said information storage medium at the time of use, and shows a physical position on an information storage medium to this 1st field, Set up a logical address (LBN) for managing logically information recorded on said information storage medium, and. Are the unit on which information was recorded succeeding said logical address space top, and a unit to which a continuous logical address number (LBN) is given is defined as the extent (Extent) in this unit, Although it enables it to record information in a unit of said extent and the above-mentioned logical address number is given also to a defect region generated in a field (User Area) of the above 1st on said information storage medium, An information reproduction mode, wherein only a place where the above-mentioned extent was divided and said information was recorded reproduces the above-mentioned information on an information recording medium that an extent for Information Storage Division is formed, between a place where information is recorded, and said defect region.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]this invention -- video information -- and -- or it is related with the setting method of the Information Storage Division place for recording continuously on an information storage medium, the Information Storage Division method, and the Information Storage Division playback equipment that enables the record, without carrying out the intermission of the information, including speech information etc., logically. This invention also includes the contents about the information storage medium which has a data structure for making refreshable continuously the information by which **** record with a basis was carried out in the above-mentioned record method.

[0002]

[Description of the Prior Art]LD (laser disc) and a DVD video disk exist as an information storage medium with which video information or speech information is recorded. However, the above-mentioned information storage medium is exclusively for reproduction, and the defect region on an information storage medium does not exist. A DVD-RAM disk is existing as a medium which records computer information. Additional recording is possible for this medium, and the substitute processing method for the defect region generated on the information storage medium is also established.

[0003]It is linear replacement (Linear Replacement) as the substitute processing method for the defect region at the time of the computer information record over a RAM disk. There are some which are called processing.

[0004]This processing is the method of securing the alternative area in spare area (Spare Area) secured in another field distant physically [the user area (User Area)], and setting up a logical block number (LBN) here, when there is a defect region. If an optical head has a defect region in the middle of record or playback on a disk at the time of Information Storage Division to a disk top, or playback, this method, Data is recorded or recorded on the physically distant spare area of a position, it must return to the interrupted position after that, and the data of a continuation must be recorded. For this reason, a motion of an optical head must be made frequent (see drawing 16 (d)).

[0005]The section in charge which performs Data Processing Division and record reproduction of information in a electronic computing system, Recording playback application software (it carries out abbreviated to rec/play application henceforth) 1

layer, file system (File System)2 layer, optical disk drive (Optical Disk Drive;ODD) 3 layer, and the control hierarchy are divided.

[0006]And the command used as an interface is defined among each hierarchy. The addresses treated on each hierarchy also differ. That is, deal with the rec/play application 1 and AVAddress File System2, Dealing with a logical sector number (LSN) or a logical block number (LBN) based on AV Address, ODD3 treats a physical sector number (PSN) based on a logical sector number (LSN) and a logical block number (LBN) (see drawing 6).

[0007]

[Problem(s) to be Solved by the Invention]For example, the case where the video information or speech information according to the recording format of the DVD video disk is recorded on a DVD-RAM disk is considered. As mentioned above, when Linear Replacement processing is performed as the defective processing (substitution) method, if a defective ECC block is encountered at the time of record -- an optical head -- each time -- The necessity of going back and forth between User Area 723 mentioned later and Spare Area 724 arises. Thus, if access operation of an optical head is frequently performed at the time of record, the amount of video information saved in a buffer memory will exceed memory space from relations, such as access time for the transfer rate of input data and data volume, and record, and an amount of buffer memory, and continuous recording will become impossible.

[0008]Although he would like to manage the video information recorded without being fascinated by the defect management on an information storage medium in recording playback application software 1 layer, When a lot of defect regions occur on an information storage medium, by the conventional method, the influence of the defect on an information storage medium also affects the recording playback application software layer 1, and stable video information management becomes difficult.

[0009]Then, there is a place made into the purpose of this invention in providing the Information Storage Division playback equipment which performs the setting method of the recording place which can perform continuous recording stably, a record method, and it, without being influenced even if a lot of defect regions exist on an information storage medium. It is in providing the information storage medium (and data structure of the information currently recorded there) with which information is recorded in the form which was most suitable for the continuous recording which carried out [above-mentioned] stability.

[0010]

[Means for Solving the Problem]in order that this invention may attain the

above-mentioned purpose -- (1) -- this invention sets up a logical address also to a defect region on an information storage medium, and divides a defect region and sets up the extent (Extent). (2) This invention performs skipping (Skipping) to a defect region at the time of audio video (AV) Information Storage Division, and after an end of record, it avoids a defect region and carry out Extent setting out. (3) This invention straddles a defect region and another file record section which already exists, and sets up the contiguous data area (Contiguous Data Area). (4) This invention specifies size of the above-mentioned contiguous data area further again. This invention specifies size of total of a record section and a defect region of another file contained in (5) contiguous data area.

[0011]By a means of the above (1), setting out of Extent which avoided a defect region on File System 2 is attained. That is, since a logical address (LBN) is set up to a defect region, processing which reduces access frequency of an optical head by File System 2 side can be performed. Since Extent which divided and set up a defect region is set up on a file entry (FileEntry), Since a place to reproduce directly according to information recorded on File Entry can be accessed without referring to deficiency management information (TDM3472) in File System 2 side, processing on File System 2 can also be performed easily. By a means of the above (2), Extent arrangement information is stored temporarily in semiconductor memory, it will collect after an end of record of the whole video information, File Entry information will be rewritten, access frequency of an optical head decreases, and continuous recording of video information becomes easy. By adopting a setting method of Contiguous Data Area of the above-mentioned means of (3), Although PC file which performed Linear Replacement processing enters a defect region, Congiguous Data Area can be again set up after deletion of Extent, and effective use of a record section on an information storage medium is attained.

[0012]

[Embodiment of the Invention]This embodiment of the invention is described with reference to Drawings below.

[0013]Drawing 1 shows the typical feature section of this invention. In each figure, numerals are filled in and explained in a block. This invention equips with the feature the point described below.

[0014]That is, drawing 1 is a figure explaining the setting method of contiguous-data-area (Contiguous Data Area) recorded on an information storage medium (optical disc), and the presetting method of extent (extent) before record.

[0015]As shown in drawing 1 (a), record information by a file basis on said information storage medium, and. As shown in drawing 1 (d), the contiguous data area (Contiguous

Data Area) which is a continuous recording field for reducing the access frequency of an optical head, having it and making possible continuous recording to said information storage medium is defined. This contiguous data area straddles and sets up either one of another file record section already recorded on said information storage medium, or the defect region on an information storage medium, as shown in drawing 1 (b), As shown in drawing 1 (c), the extent (extent) as an Information Storage Division place is set up to the field divided by another file record section or the defect region on an information storage medium.

[0016]The outline structure of the Information Storage Division playback equipment in this invention is explained first. As shown in drawing 2, an information reproducing device or Information Storage Division playback equipment 103 comprises two blocks greatly. An information reproduction part or the Information Storage Division regenerating section (physical system block) 101 rotates an information storage medium (optical disc), It has the function to read the information which records on an information storage medium (optical disc) beforehand, and is in it using an optical head (or new information is recorded on an information storage medium (optical disc)). The spindle motor which specifically rotates an information storage medium (optical disc), It comprises an optical head moving mechanism for moving an optical head to the radius position on the information storage medium (optical disc) with which the optical head which plays the information which record and is in an information storage medium (optical disc), and information to play are recorded, a ****** servo circuit, etc. The detailed explanation about this block using drawing 3 is mentioned later.

[0017]The application formation part (application block) 102 serves to add processing to the regenerative signal c acquired from the information reproduction part or the Information Storage Division regenerating section (physical system block) 101, and to transmit the reproduction information a out of an information reproducing device or Information Storage Division playback equipment 103. The composition within this block changes according to the concrete use (purpose of use) of an information reproducing device or Information Storage Division playback equipment 103. Even if attached to the composition of this application formation part (application block) 102, it mentions later.

[0018]The recorded information b which was given from the outside in the following procedures in the case of Information Storage Division playback equipment is recorded on an information storage medium (optical disc).

- The recorded information b given from the outside is directly transmitted to the application formation part (application block) 102.

- Transmit the record signal d to the Information Storage Division regenerating section (physical system block) 101 after adding processing to the recorded information b within the application formation part (application block) 102.
- Record the transmitted record signal d on an information storage medium within the Information Storage Division regenerating section (physical system block) 101.
[0019]Next, the internal structure of the Information Storage Division regenerating section (physical system block) 101 in Information Storage Division playback equipment 103 is explained.
[0020]Drawing 3 is a block diagram explaining an example of the composition in the Information Storage Division regenerating section (physical system block) of Information Storage Division playback equipment.
[0021]Explanation of the basic function of the Information Storage Division regenerating section.
[0022]using the condensing spot of a laser beam for the prescribed position on the information storage medium (optical disc) 201 in the Information Storage Division regenerating section -- record of new information -- or -- rewriting (elimination of information is also included) -- it carries out. From the prescribed position on the information storage medium 201, the information already recorded is reproduced using the condensing spot of a laser beam.
[0023]Explanation of the basic function achievement means of the Information Storage Division regenerating section.
[0024]In order to attain the above-mentioned basic function, condensing spot is made to trace along the track on the information storage medium 201 in the Information Storage Division regenerating section (flattery). The light volume (strength) of the condensing spot with which the information storage medium 201 is irradiated is changed, and record / reproduction / elimination of information are changed. In order to record the record signal d given from the outside by high density and a low error rate, it changes into the optimal signal.
[0025]Structure of a working part, and explanation of operation of a detection section.
[0026]Fundamentally, optical head 202 basic structure and the <signal detection circuit <signal detection by optical head 202>> optical head 202 comprise the semiconductor laser element, photodetector, and object lens which are light sources. The laser beam which emitted light from the semiconductor laser element is condensed on the information storage medium (optical disc) 201 with an object lens. Photoelectric conversion of the laser beam reflected with the light reflection film or light reflex nature record film of the information storage medium 201 is carried out by a photodetector.

[0027]The detection current acquired with the photodetector is current by the amplifier 213. - Voltage conversion is carried out and it becomes a detecting signal. This detecting signal is processed in the focal track error detector circuit 217 or the binarization circuit 212.

[0028]Generally, the photodetector was divided into two or more photodetection fields, and light volume change irradiated by each photodetection field is detected separately. The sum and a difference are calculated to each detecting signal of this in the focal track error detector circuit 217, and detection of a focal gap and a track gap is performed. After removing a focal gap and a track gap substantially by this detection and servo operation, the reflected-light-quantity change from the light reflection film or light reflex nature record film of the information storage medium 201 is detected, and the signal on the information storage medium 201 is reproduced.

[0029]As a method of detecting optically, the amount of <focal gap detecting method> focus gaps, For example, : with the following [astigmatic method] -- It is the method of detecting the shape change of the laser beam which arranges the optical element (not shown) which makes the detecting optical path of a laser beam reflected with the light reflection film or light reflex nature record film of the information storage medium 201 generating astigmatism, and is irradiated on a photodetector. The photodetection field is quadrisected in the shape of a diagonal line. To each detecting signal acquired from each detection area, the sum of the signal from the detection area on a vertical angle is taken in the focal track error detector circuit 217, the difference of the Hotan is taken, and a focus-error-detection signal is acquired.

The [knife-edge method] -- It is the method of arranging knife edge which shades a part asymmetrically to the laser beam reflected with the information storage medium 201. A photodetection field is divided into two, takes the difference between the detecting signals acquired from each detection area, and acquires a focus-error-detection signal.

[0030]Usually, any of the above-mentioned astigmatic method or the knife-edge method or ** is adopted.

[0031]The <track gap detecting method> information storage medium (optical disc) 201 has a track of spiral shape or concentric circle shape, and information is recorded on a track. Condensing spot is made to trace along this track, and reproduction of information, or record/elimination is performed. In order to be stabilized and to make condensing spot trace along a track, it is necessary to detect a relative location gap of a track and condensing spot optically.

[0032]As a track gap detecting method, generally, :[phase difference detection (Differential Phase Detection) for which the following method is used -- law --] -- the

intensity distribution change on the photodetector of the laser beam reflected with the light reflection film or light reflex nature record film of the information storage medium (optical disc) 201 is detected. The photodetection field is quadrisected on the diagonal line. To each detecting signal acquired from each detection area, the sum of the signal from the detection area on a vertical angle is taken in the focal track error detector circuit 217, the difference of the Hotan is taken, and a track error detecting signal is acquired.

[0033][push pull (Push-Pull) -- law --] -- the intensity distribution change on the photodetector of the laser beam reflected -- information-storage-medium 1201 is detected. A photodetection field is divided into two, takes the difference between the detecting signals acquired from each detection area, and acquires a track error detecting signal.

[0034][-- a twin spot (Twin-Spot) -- law --] -- a diffraction element etc. are arranged in the light transmission system between a semiconductor laser element and the information storage medium 201, wavefront splitting of the light is carried out to plurality, and reflected-light-quantity change of the primary [**] diffracted light with which it irradiates on the information storage medium 201 is detected. The photodetection field which detects the reflected light quantity of the primary [+] diffracted light and the reflected light quantity of -primary diffracted light separately apart from the photodetection field for regenerative-signal detection is arranged, the difference of each detecting signal is taken, and a track error detecting signal is acquired.

[0035]The object lens (not shown) which makes the laser beam which emitted light from the <objective lens actuator structure> semiconductor laser element condense on the information storage medium 201 has a structure movable in the biaxial direction according to the output current of the objective lens actuator drive circuit 218. There are the following two in the move direction of this object lens. That is, for focal gap amendment, it moves perpendicularly to the information storage medium 201, and aims to move to the radial direction of the information storage medium 201 for track gap amendment.

[0036]The moving mechanism (not shown) of an object lens is called an objective lens actuator. : by which the following is well used for objective lens actuator structure, for example [axial sliding method] -- by the method which the braid of an object lens and one moves along with a medial axis (shaft). A braid is the way move in the direction in alignment with a medial axis, perform focal gap amendment, and rotational movement of the braid on the basis of a medial axis performs track gap amendment.

[0037][4 wire methods] -- The braid of object lens one is connected with four wires to the stationary system, and it is the method of moving a braid in the biaxial direction using the elastic deformation of a wire.
[0038]Any method of the above has a permanent magnet and a coil, and it has structure to which a braid is moved by sending current through the coil connected with the braid.
[0039]It equips with the information storage medium (optical disc) 201 on the rotating table 221 which rotates with the driving force of the <roll control system of information storage medium 201> spindle motor 204.
[0040]The regenerative signal acquired from the information storage medium 201 detects the number of rotations of the information storage medium 10. That is, the detecting signal (analog signal) of amplifier 213 output is changed into a digital signal in the binarization circuit 212, and generates a constant period signal (reference clock signal) by PLL circuit 211 from this signal. In the information-storage-medium rotational-speed-detection circuit 214, the number of rotations of the information storage medium 201 is detected using this signal, and that value is outputted.
[0041]The correspondence table of the information-storage-medium number of rotations corresponding to reproduction or the radius position recorded / eliminated is beforehand recorded on the semiconductor memory 219 on the information storage medium 201. If a playback position or record/elimination position is decided, the control section 220 will set up the target revolving speed of the information storage medium 201 with reference to semiconductor memory 219 information, and will notify the value to the spindle motor drive circuit 215.
[0042]The difference of this target revolving speed and the output signal (number of rotations in the actual condition) of the information-storage-medium rotational-speed-detection circuit 214 is searched for, and the driving current according to that result is given to the spindle motor 204, and it controls by the spindle motor drive circuit 215 so that the number of rotations of the spindle motor 204 becomes fixed. The output signal of the information-storage-medium rotational-speed-detection circuit 214 is a pulse signal which has the frequency corresponding to the number of rotations of the information storage medium 201, and controls by the spindle motor drive circuit 215 to both the frequency of this pulse signal, and a pulse phase (frequency control and phase control).
[0043]<Optical head moving mechanism> This mechanism has the optical head moving mechanism (feed motor) 203 in order to move the optical head 202 to the radial direction of the information storage medium 201.
[0044]As guide structure to which the optical head 202 is moved, a cylindrical guide

shaft is used in many cases. In this guide structure, the optical head 202 is moved using friction between the bushes attached to a part of this guide shaft and optical head 202. There is also a method using the bearing which made frictional force reduce using rotational movement in addition to it.

[0045]The transmitting-driving-force method of moving the optical head 202, Although not illustrated, the rotary motor with which the pinion (rotation gear) stuck to the stationary system has been arranged, the rack which is a linear shape gear which gears with a pinion has been arranged on the side of the optical head 202, and rotational movement of a rotary motor is changed into the straight-line motion of the optical head 202. As the other transmitting-driving-force method, the linear motor system which sends current through the coil which has arranged the permanent magnet to the stationary system and has been arranged to the optical head 202, and is moved in the linear direction may be used.

[0046]Current is sent through a feed motor and it is made to generate the driving force for optical head 202 movement fundamentally by any method of a rotary motor and a linear motor. This current for a drive is supplied from the feed motor drive circuit 216.

[0047]In order to perform <functional> <condensing spot trace control> focus gap amendment, or track gap amendment, [of each control circuit] The circuit which supplies driving current to the objective lens actuator (not shown) in the optical head 202 according to the output signal (detecting signal) of the focal track error detector circuit 217 is the objective lens actuator drive circuit 218. This drive circuit 218 has the phase compensation circuit for a characteristic improvement doubled with the frequency characteristic of the objective lens actuator inside in order to carry out the high speed response of the high frequency domain **** object lens movement.

[0048]responding to the command of the control section 220 in the objective lens actuator drive circuit 218 -- (**) -- ON-and-OFF processing and; of a focus / track gap correction operation (a focus / track loop)

(**) Processing (it performs at the time of a focus / track loop-off) which moves an object lens to the perpendicular direction (focusing direction) of the information storage medium 201 at a low speed;

(**) Using a kick pulse, an object lens is slightly moved to the radial direction (direction which crosses a track) of the information storage medium 201, and processing for which condensing spot is moved to the next track is performed.

[0049]The change of <laser intensity control <change processing of reproduction, and record/elimination>> reproduction, and record/elimination is performed by changing the light volume of the condensing spot with which it irradiates on the information storage

medium 201.
[0050]as opposed to the information storage medium using a phase change method -- general -- [light volume at time of record] >[light volume at time of elimination] > [light volume at the time of reproduction] -- (1)
To the information storage medium ****** is realized and using the optical magnetic system, it is generally [the light volume at the time of record]. [Light volume at time of elimination] > [light volume at the time of reproduction] -- (2)
There is ******. The polarity of the external magnetic field (not shown) added to the information storage medium 201 at the time of record/elimination is changed, and processing of record and elimination is controlled by the case of an optical magnetic system. In the time of information reproduction, it is irradiating with fixed light volume continuously on the information storage medium 201.
[0051]In recording new information, it adds pulse form intermittent light volume on the light volume at the time of this reproduction. When a semiconductor laser element carries out pulse radiation with big light volume, the light reflex nature record film of the information storage medium 201 causes an optical change or a shape change locally, and a recording mark is formed. When carrying out overwrite on the field already recorded, pulse radiation of the semiconductor laser element is carried out similarly.
[0052]In eliminating the information already recorded, it carries out continuous irradiation of the bigger fixed light volume than the time of reproduction. In eliminating information continuously, it returns irradiation light quantity for every specific cycles, such as a sector unit, at the time of reproduction, and in parallel with erasing processing, information reproduction is performed intermittently. Erasing processing is performed checking that there is no error of an erase track by reproducing the track number and address of the track which this eliminates intermittently.
[0053]Although it is <-laser-light-emitting-controlling, > not being illustrated, in the optical head 202, the photodetector for detecting the light quantity of a semiconductor laser element is built in. In the laser drive circuit 205, the difference of the photodetector output (detecting signal of semiconductor laser element light quantity) and the luminescence reference signal given from record, reproduction, and the erasing control waveform generating circuit 206 is taken, and feedback control of the driving current to a semiconductor laser is carried out based on the result.
[0054]If it is equipped with the <many operations <start control> about control system of working part> information storage medium (optical disc) 201 on the rotating table 221 and start control is started, processing according to the following procedures will be performed.

(1) Target revolving speed is told to the spindle motor drive circuit 215 from the control section 220, driving current is supplied to the spindle motor 204 from the spindle motor drive circuit 215, and the spindle motor 204 starts rotation.
(2) A command (executive instruction) is simultaneously taken out from the control section 220 to the feed motor drive circuit 216, driving current is supplied to the optical head drive mechanism (feed motor) 203 from the feed motor drive circuit 216, and the optical head 202 moves to the most-inner-circumference position of the information storage medium 10. The result checks that the optical head 202 has been to the inner periphery further across the field where the information on the information storage medium 201 is recorded.
(3) If the spindle motor 204 reaches target revolving speed, the status (condition report) will be taken out to the control section 220.
(4) According to the amount signal of regenerated light sent to record, reproduction, and the erasing control waveform generating circuit 206 from the control section 220, current is supplied to the semiconductor laser element in the optical head 202 from the semiconductor laser driving circuit 205, and laser light emitting begins.
[0055]The optimal irradiation light quantity at the time of playback changes with kinds of information storage medium (optical disc) 201. At the time of starting, the current value supplied to a semiconductor laser element is set as the value corresponding to the value with the lowest irradiation light quantity of them.
(5) Shift according to the command from the control section 220 in the position which kept away most the object lens (not shown) in the optical head 202 from the information storage medium 201, and the objective lens actuator drive circuit 218 controls an object lens to bring an object lens close to the information storage medium 201 slowly.
(6) Monitor the amount of focal gaps simultaneously in the focal track error detector circuit 217, when an object lens comes near the position whose focus suits, take out status, and notify what "the object lens came near the focusing point position" to the control section 220.
(7) If the notice is got, a command will be taken out with the control section 220 to the objective lens actuator drive circuit 218 so that a focal loop may be made one.
(8) The control section 220 takes out a command to the feed motor drive circuit 216, making a focal loop one, and moves the optical head 202 in the direction of a peripheral part of the information storage medium 201 slowly.
(9) If the regenerative signal from the optical head 202 is monitored simultaneously and the optical head 202 arrives at the record section on the information storage medium 201, movement of the optical head 202 will be stopped and the command which makes a

track loop the one to the objective lens actuator drive circuit 218 will be taken out.
(10) The "optimal light volume at the time of reproduction" and the "optimal light volume at the time of record/elimination" which continue and are recorded on the inner periphery of the information storage medium 201 are reproduced, and the information is recorded on the semiconductor memory 219 via the control section 220.
(11) Further, by the control section 220, the signal doubled with the "optimal light volume at the time of reproduction" is sent to record, reproduction, and the erasing control waveform generating circuit 206, and the light quantity of the semiconductor laser element at the time of reproduction is reset.
(12) And according to the "optimal light volume at the time of record/elimination" currently recorded on the information storage medium 201, the light quantity of the semiconductor laser element at the time of record/elimination is set up.
[0056]The information about what kind of contents for the access destination information recorded on the <access control> information storage medium 201 to be recorded on which place on the reproduction information storage 201, and to have again changes with kinds of information storage medium 201. For example, in the DVD disk, this information is recorded on a directory management domain or a navigation pack in the information storage medium 201, etc.
[0057]Here, the directory management domain is usually collected and recorded on the inner circumference field or outer periphery area of the information storage medium 201. A navigation pack is contained in a data unit called VOBU (video object unit) in VOBS (video object set) based on the data structure of PS (program stream) of MPEG 2, The following image is recording that information currently recorded where.
[0058]An access point is determined from the information which reproduced the information in the above-mentioned field first and was acquired [reproduction or] in specific information there to record/eliminate.
[0059]In the <rough access control> control section 220, it asks for the radius position of an access point by calculation, and the distance between the optical head 202 present positions is deduced.
[0060]The velocity curve information which can reach most to optical head 202 migration length in a short time is recorded in the semiconductor memory 219 a priori. The control section 220 reads the information and performs the movement controls of the optical head 202 by the following methods according to the velocity curve.
[0061]That is, after taking out a command from the control section 220 to the objective lens actuator drive circuit 218 and turning off a track loop, the feed motor drive circuit 216 is controlled and movement of the optical head 202 is made to start.

[0062]If condensing spot crosses the track on the information storage medium 201, a track error detecting signal will occur in the focal track error detector circuit 217. The relative velocity of the condensing spot to the information storage medium 201 is detectable using this track error detecting signal.

[0063]In the feed motor drive circuit 216, the difference of the relative velocity of the condensing spot obtained from this focal track error detector circuit 217 and the target speed information sent in detail from the control section 220 is calculated, The optical head 202 is moved applying feedback control to the driving current to the optical head drive mechanism (feed motor) 203 by the result. As the paragraph of the above <optical head moving mechanism> described, between the guide shaft, the bush, or the bearing, frictional force is always working. While the optical head 202 is moving at high speed, dynamical friction works, but since the movement speed of the optical head 202 is slow, static friction works the time of a move start, and just before a stop. when this static friction works, just before a stop especially, frictional force is increasing relatively. In order to cope with this increase in frictional force, the amplification factor (gain) of a control system is made to increase by the command from the control section 220 so that the current supplied to the optical head drive mechanism (feed motor) 203 may become large.

[0064]When the <dense access control> optical head 202 arrives at a target position, a command is taken out from the control section 220 to the objective lens actuator drive circuit 218, and a track loop is made one.

[0065]Condensing spot reproduces the address or track number of the portion, tracing along the track on the information storage medium 201.

[0066]The present condensing spot position is deduced from the address or track number of a there, the error track number from an attainment target position is calculated within the control section 220, and a track number required for movement of condensing spot is notified to the objective lens actuator drive circuit 218.

[0067]If 1 set of kick pulses are generated in the objective lens actuator drive circuit 218, the information storage medium 201 will move slightly radially, and condensing spot will move an object lens to the next track.

[0068]A track loop is made to turn off temporarily, and after generating the kick pulse of the number of times doubled with the information from the control section 220, a track loop is made the one in the objective lens actuator drive circuit 218 again.

[0069]It checks that the control section 220 reproduced the information on the position which condensing spot is tracing (an address or track number), and has accessed the target track after the end of dense access.

[0070]The track error detecting signal outputted from continuous recording / reproduction / <erasing control> focus track error detector circuit 217 is inputted into the feed motor drive circuit 216. The "time" of mentioning above in the feed motor drive circuit 216, it is controlled by the control section 220 not to use a track error detecting signal. ["time / access control / start control and /"]
[0071]After checking that condensing spot has arrived at the target track by access, a part of track error detecting signal is supplied via the motor drive circuit 216 by the command from the control section 220 as driving current to the optical head drive mechanism (feed motor) 203. This control is continued during the period which is performing reproduction, or record/erasing processing to continuation.
[0072]It is equipped with the center position of the information storage medium 201 with the eccentricity shifted as slightly as the center position of the rotating table 221. If a part of track error detecting signal is supplied as driving current, the optical head 202 whole will move slightly according to eccentricity.
[0073]If reproduction, or record/erasing processing is performed continuously for a long time, a condensing spot position will move in an outer peripheral direction or the direction of inner circumference gradually. When a part of track error detecting signal is supplied as driving current to the optical head moving mechanism (feed motor) 203, according to it, the optical head 202 moves in an outer peripheral direction or the direction of inner circumference gradually.
[0074]Thus, a track loop can be stabilized by easing the burden of track gap amendment of an objective lens actuator.
[0075]<End control> A series of processings are completed, and when terminating operation, processing is performed according to the following procedures.
(1) The command which makes a track loop turn off is taken out from the control section 220 to the objective lens actuator drive circuit 218.
(2) The command which makes a focal loop turn off is taken out from the control section 220 to the objective lens actuator drive circuit 218.
(3) The command which stops luminescence of a semiconductor laser element is taken out from the control section 220 to record, reproduction, and the erasing control waveform generating circuit 206.
(4) 0 is notified as a reference rotational frequency to the spindle motor drive circuit 215.
[0076]As the paragraph of <the signal detection by the optical head 202> of the <flow of record signal / regenerative signal to information storage medium> <flow of signal at time of reproduction> <binary-izing and PLL circuit> point described, The reflected-light-quantity change from the light reflection film or light reflex nature

record film of the information storage medium (optical disc) 201 is detected, and the signal on the information storage medium 201 is played. The signal acquired with the amplifier 213 has an analog-spectrum form. The binarization circuit 212 changes the analog signal into the digital signal of the binary which consists of "1" and "0" using a comparator.

[0077]In this way, in PLL circuit 211, the reference signal at the time of information reproduction is taken out from the regenerative signal acquired in the binarization circuit 212. That is, PLL circuit 211 builds in the oscillator of a frequency variable, and comparison of frequency and a phase is performed between the pulse signal (reference clock) and binarization circuit 212 output signal which are outputted from this oscillator. By feeding back this comparison result to an oscillator output, the reference signal at the time of information reproduction is taken out.

[0078]The <recovery of signal> demodulator circuit 210 builds in the translation table showing the relation between the modulated signal and the signal after a recovery. The demodulator circuit 210 returns an input signal (modulated signal) to the original signal (signal to which it restored), referring to a translation table according to the reference clock obtained in PLL circuit 211. The signal to which it restored is recorded on the semiconductor memory 219.

[0079]Inside the <error correction processing> error correction circuit 209, to the signal saved at the semiconductor memory 219, an error part is detected using inner code PI and the outside numerals PO, and the pointer flag of an error part is set. Then, after correcting the signal of an error part one by one according to an error pointer flag, reading a signal from the semiconductor memory 219, after-correction information is again recorded on the semiconductor memory 219.

[0080]In outputting outside by making into the regenerative signal c the information reproduced from the information storage medium 201, inner code PI and the outside numerals PO are removed from the information after an error correction recorded on the semiconductor memory 219, and it transmits to data I/O Interface Division 222 via the bus line 224. Data I/O Interface Division 222 outputs the signal sent from the error correction circuit 209 as the regenerative signal c.

[0081]To the signal recorded on the <signal forms recorded on information storage medium 201> information storage medium 201, satisfying the following things enables correction of the recorded information error resulting from the defect on the :(b) information storage medium 201 demanded.;

(**) Set the dc component of a regenerative signal to "0", and attain simplification of a reproducing processing circuit.;

(**) Record information to the information storage medium 201 as with high density as possible.

[0082]In order to satisfy the above demand, in the Information Storage Division regenerating section (physical system block), "addition of an error correction function" and "signal transformation (strange recovery of a signal) to recorded information" are performed.

[0083]<Flow of signal at time of record> <error correction code ECC attached-processing> error correction code ECC attached processing is explained. The information d to record on the information storage medium 201 is inputted into data I/O Interface Division 222 in the form of a live signal. This record signal d is recorded on the semiconductor memory 219 as it is. Then, the following attached processing of ECC is performed in ECC encoder 208.

[0084]Hereafter, the example of the ECC additional means using a product code is explained.

[0085]The record signal d is put in order one line at a time one by one every 172 bytes within the semiconductor memory 219, and let them be 1 set of ECC blocks by 192 lines (it becomes the amount of information of about 32 K bytes by 172-byte line x192 sequence of bytes). To the live signal (record signal d) in 1 set of ECC blocks which comprise this "172-byte line x192 sequence of bytes", 172 bytes of inner code PI [10 bytes per line of] is calculated, and additional recording is carried out into the semiconductor memory 219. Furthermore, the numerals PO are calculated outside 16 bytes per row of a byte unit, and additional recording is carried out into the semiconductor memory 219.

[0086]And a total of 2366 bytes (=(12+1) x (172+10)) for one line (1x (172+10) byte) of 12 lines (12x (172+10) byte) including 10 bytes of inner code PI and the outside numerals PO are made into a unit, The information for which error correction code ECC attached processing was made is recorded in 1 sector of the information storage medium 10.

[0087]ECC encoder 208 will once transmit the information to the semiconductor memory 219, if addition of inner code PI and the outside numerals PO is completed. When information is recorded on the information storage medium 201, every 2366 bytes of signal for one sector is transmitted to the modulation circuit 207 from the semiconductor memory 219.

[0088]In order to bring the dc component (DSV:Digital Sum Value or Digital Sum Variation) of a <signal abnormal-conditions> regenerative signal close to "0" and to record information with high density to the information storage medium 201, The signal abnormal conditions which are conversion of signal forms are performed in the

modulation circuit 207. The modulation circuit 207 and the demodulator circuit 210 build in the translation table showing the relation between the original signal and the signal after abnormal conditions, respectively.

[0089]The modulation circuit 207 is changed into another signal (code), dividing the signal transmitted from ECC encoder 208 every two or more bits according to a predetermined modulation method, and referring to the above-mentioned translation table. For example, when 8/16 abnormal conditions (RLL (2, 10) code) are used as a modulation method, two kinds of translation tables existed, and the translation table for reference is changed in detail so that the dc component (DSV) after abnormal conditions may approach 0.

[0090]That by which "1" generally comes to the front end position and the back terminal position of :[mark length recording method] recording mark as which the following are adopted as a recording method when recording a recording mark on the <recording waveform generating> information storage medium (optical disc) 201.

[0091][Recording method between marks] The center position of a recording mark is the position and match of "1." When adopting mark length record, it is necessary to form a comparatively long recording mark. In this case, if it continues irradiating the information storage medium 10 with the big light volume for record beyond fixed time, width will spread only the rear of a mark by the thermal storage effect of the light reflex nature record film of the information storage medium 201, and a "raindrops"-shaped recording mark will be formed. In order to remove this evil, when forming a recording mark with long length, the measure against dividing the laser driving signal for record into two or more recording pulses, or changing the recording waveform of the laser for record stair-like etc. is taken.

[0092]In record, reproduction, and the erasing control waveform generating circuit 206, according to the record signal sent from the modulation circuit 207, the above recording waveforms are created and the driving signal with this recording waveform is sent to the semiconductor laser driving circuit 205.

[0093]Next, the flow of the signal during the block in the above-mentioned recording and reproducing device is summarized.

1) The composition in the Information Storage Division regenerating section (physical system block) which summarized the portion relevant to the recording processing of information and regeneration to the information storage medium (optical disc) 201 in the input recording and reproducing device to the Information Storage Division playback equipment of the live signal which should be recorded is illustrated. The record signal d sent from host computers, such as PC (personal computer) and EWS

(engineering workstation), is inputted in the Information Storage Division regenerating section (physical system block) 101 via data I/O Interface Division 222.

[0094]2) With split application data I/O Interface Division 222 in every 2048 bytes of the record signal d, perform scramble processing after dividing the record signal d every 2048 bytes serially and adding data ID510 etc. The signal acquired as a result is sent to ECC encoder 208.

[0095]3) In creation ECC encoder 208 of an ECC block, perform addition of inner code PI (internal parity code) and the outside numerals PO (external parity code) after collecting the signals after hanging scramble to a record signal 16 sets and making the block of "172 bytes x 192 rows."

4) Perform interleave processing of the outside numerals PO after that in interleave processing ECC encoder 208.

[0096]5) Add a synchronization code in the signal modulation process modulation circuit 207 after modulating the signal after the numerals PO outside outside carry out interleave processing.

[0097]6) Corresponding to recording waveform creation processing, as a result the acquired signal, a recording waveform is created in record, reproduction, and the erasing control waveform generating circuit 206, and this recording waveform is sent to the laser drive circuit 205.

[0098]In the information storage medium (DVD-RAM disk) 201, since the method of "mark length record" is adopted, the rise timing of a recording pulse and the falling timing of a recording pulse are in agreement with the timing of "1" of the signal after abnormal conditions.

[0099]7) It glares from the recording processing optical head 202 to the information storage medium (optical disc) 10, the light volume of the laser beam which condenses on the record film of the information storage medium (optical disc) 201 changes intermittently, and a recording mark is formed on the record film of the information storage medium (optical disc) 201.

[0100]Drawing 4 is a flow chart which explains an example of the setting-operation of a logical block number to a DVD-RAM disk etc., for example. It explains also referring to drawing 3.

[0101]When the turntable 221 is loaded with the information storage medium (optical disc) 201 (step ST131), the control section 220 makes rotation of the spindle motor 204 start (step ST132).

[0102]One [after information-storage-medium (optical disc) 201 rotation begins, the laser emission of the optical head 202 is started (step ST133), and / the focus servo loop

of the object lens in the optical head 202] (step ST134).
[0103]After laser light emitting, the control section 220 operates the feed motor 203, and is moved to Lead-in Area 607 of the information storage medium (optical disc) 201 whose optical head 202 is under rotation (step ST135). And one [the track servo loop of the object lens in the optical head 202] (step ST136).
[0104]If a track servo becomes active, the optical head 202 will play the information on Control data Zone 655 (refer to drawing 9 mentioned later) in Lead-in Area 607 of the information storage medium (optical disc) 201 (step ST137). By reproducing Book type and Part version 671 in this Control data Zone 655. It is checked that it is a medium (a DVD-RAM disk or a DVD-R disk) which the information storage medium (optical disc) 201 rotated now can record (step ST138). Here, suppose that the medium 10 is a DVD-RAM disk.
[0105]If it is checked that the information storage medium (optical disc) 201 is a DVD-RAM disk, From Control data Zone 655 of a reproduction object, the information on the optimal light volume at the time of reproduction, record, and elimination (emission power and a light emission period, or a duty ratio of a semiconductor laser, etc.) is reproduced (step ST139).
[0106]Then, the control section 220 creates the conversion table (refer to drawing 11 mentioned later) of a physical sector number and a logical sector number as what does not have a defect in the DVD-RAM disk 201 under present rotation (step ST140).
[0107]After this conversion table was created, The control section 220 is Lead-in Area 607 of the information storage medium (optical disc) 201. Inner defect management area DMA1/DMA2 663 and defect management area DMA3/DMA4 in Lead-out Area 609 691 is played, The defect distribution of the information storage medium 201 at the time (optical disc) is investigated (step ST141).
[0108]If the above-mentioned defect distribution investigation shows the defect distribution on the information storage medium (optical disc) 201, the control section 220 will correct the conversion table created as "there is no defect" according to actual defect distribution by step ST140 (step ST142). The logical sector number LSN which is a portion of each sector which specifically turned out for there to be a defect, and supported physical sector number PSN is shifted.
[0109]Drawing 5 is a flow chart which explains an example of the defective processing operation (processing by the side of a drive) in a DVD-RAM disk etc., for example. The flow chart of drawing 5 is explained also referring to drawing 3 below.
[0110]The file size of the head logical block number LBN of information and recorded information recorded on the medium (for example, DVD-RAM disk) 201 with which the

present drive is loaded is first specified to MPU in the control section 220 (step ST151).
[0111]Then, MPU of the control section 220 computes the head logical sector number LSN of the information to record from the specified head logical block number LBN (step ST152). In this way, the write-in logical sector number from the computed file size which head-logical-sector-number-LSN(ed) and was specified to the information storage medium (optical disc) 201 becomes settled.
[0112]Next, MPU of the control section 220 investigates the defect on the disk 201 while writing a recording information file in the appointed address of the DVD-RAM disk 201 (step ST153).
[0113]If a defect is not detected during this file writing, it means that the recording information file was recorded that there are no abnormalities in a predetermined logical sector number (that is, ** which an error does not generate), and recording processing is completed normally (step ST155).
[0114]On the other hand, if a defect is detected during file writing, it will be predetermined alternating processing (for example, linear alternating processing (Linear Replacement Algorithm) is performed (step ST156).).
[0115]The newly detected defect is DMA1/DMA2 of Lead-in Area 607 of a disk after this alternating processing. DMA3/DMA4 of 663 and Lead-out Area 609 Additional registration is carried out to 691 (step ST157). (see drawing 9 and drawing 10 which are mentioned later) DMA1/DMA2 to the information storage medium (optical disc) 201 663 and DMA3/DMA4 After the additional registration of 691, These DMA1/DMA2 663 and DMA3/DMA4 Based on the contents of registration of 691, the contents of the conversion table created by step ST140 of drawing 4 are corrected (step ST158).
[0116]Drawing 6 shows the relation of application required of the working example explanation of this invention, a file system, and ODD.
[0117]The Information Storage Division playback equipment (ODD:Optical Disk Drive) 3 of drawing 6 shows the same thing as the Information Storage Division playback equipment 140 of PC system (after-mentioned).
[0118]The program of File System 2 of drawing 6 and both of the recording playback application software (rec/play application) 1 is usually saved in HDD121 in PC system, File System 2 is transmitted to the main memory 112 at the time of the startup of the personal electronic computing system 110, The program of the recording playback application software (rec/play application) 1 is transmitted on the main memory 112 at the time of recording playback application software program use.
[0119]The personal electronic computing system composition which used the information reproducing device is shown in drawing 7.

A -- Internal structure explanation of the general personal electronic computing system 110.

[0120]A-1 -- The data / address line explanation by which direct continuation is carried out to main CPU.

[0121]The memory data line 114 to which main CPU111 in the personal computer 110 performs the information input and output between the main memory 112 directly, It has the memory address line 113 which specifies the address of the information currently recorded in the main memory 112, and the executive operation of main CPU111 progresses according to the program loaded in the main memory 112. Main CPU111 performs Information Transfer Sub-Division with various controllers through the I/O data line 146, and it specifies information content transmitted with specification of the Information Transfer Sub-Division point controller by addressing of the I/O address line 145.

[0122]A-2 -- CRT display control and keyboard control explanation.

[0123]LCD controller 115 which performs display information control of CRT display 116 is performing information exchange between main CPU111 via the memory data line 114. In order to realize high resolution and abundant expression colors, it has Video RAM 117 as a memory of CRT display 116 exclusive use. LCD controller 115 can input information directly from the main memory 112 via the memory data line 114, and can also display it on CRT display 116.

[0124]The ten key information inputted from the keyboard 119 is changed with the keyboard controller 118, and is inputted into main CPU111 via the I/O data line 146.

[0125]A-3 -- Control system explanation of built-in HDD / information reproducing device.

[0126]An IDE interface is used for the optical information reproducing devices 122, such as HDD121 built in in the personal computer 110, a CD-ROM drive, a DVD-ROM drive, in many cases. HDD121, the reproduction information from the information reproducing device 122, or the recorded information on HDD121 is transmitted to the I/O data line 146 via IDE controller 120.

[0127]When HDD121 is used especially as a boot disk, main CPU111 accesses HDD121 at the time of personal electronic computing system 110 startup, and required information is transmitted to the main memory 112.

A-4 -- A serial / parallel interface explanation with the exterior.

[0128]The serial line and the parallel line are prepared for Information Transfer Sub-Division with the external instrument of the personal electronic computing system 110, respectively.

[0129]The parallel I/F controller 123 which controls the parallel line represented in "Centro" is used when driving the direct printer 124 and the scanner 125, without passing a network. The information transmitted from the scanner 125 is transmitted to the I/O data line 146 via the parallel I/F controller 123. The information transmitted on the I/O data line 146 is transmitted to the printer 124 via the parallel I/F controller 123.
[0130]For example, when the information in Video RAM 117 currently displayed on CRT display 116 and the specific information in the main memory 112 are printed out, After transmitting these information to the I/O data line 146 via main CPU111, protocol conversion is carried out by the parallel I/F controller 123, and it is outputted to the printer 124.
[0131]About the serial information outputted outside, the protocol conversion of the information transmitted by the I/O data line 146 is carried out by the serial I/F controller 130, for example, it is outputted as the RS-232C signal e.
[0132]A-5 -- Bus-line explanation for expansion.
[0133]The personal electronic computing system 110 has various kinds of bus lines in expansion. In the personal computer of a desktop, it has PCI bus 133 and the EISA bus 126 as a bus line in many cases. Each bus line is connected to the I/O data line 146 and the I/O address line 145 via the PCI bus controller 143 or the EISA bus controller 144. The various boards connected to a bus line are divided into the board only for EISA bus 126, and the board only for PCI bus 133. Since the direction of PCI bus 133 is comparatively fit for fast transmission, the number of the boards connected to PCI bus 133 by a diagram has increased, but. It is possible not only it but to connect LAN board 139 and the SCSI board 138 to the EISA bus 126, if the board only for EISA bus 126 is used.
[0134]A-6 -- Outline functional description of the various boards of bus-line connection.
[0135]Sound Blaster board 127 : - The audio signal inputted from the microphone 128 is changed into digital information by the Sound Blaster board 127, It is inputted and processed into the main memory 112, or HDD121 and Information Storage Division playback equipment 140 via the EISA bus 126 and the I/O data line 146. When a user specifies the file name currently recorded in HDD 121 and 141, the information reproducing device 122, and Information Storage Division playback equipment 140 to hear music and a sound. After a digital sound source signal is transmitted to the Sound Blaster board 127 via the I/O data line 146 and the EISA bus 126 and is changed into an analog signal, it is outputted from the speaker 129.
[0136]- Exclusive DSP137 : DSP137 board only for the processing can be connected to a bus line to perform existing special processing at high speed.

[0137]- SCSI interface : use a SCSI interface for the information input and output between external storages in many cases. MT for information backup. (Magnetic tape) The protocol conversion and transmission information format conversion for transmitting the SCSI format information outputted and inputted between the external storages of 142, external non-portable type HDD141, and Information Storage Division playback equipment 140 grade to PCI bus 133 or the EISA bus 126. It is performing within the SCSI board 138.
[0138]- An information compression and the board only for extension : the information compression of the multimedia information, such as a sound, Still Picture Sub-Division, and video, is carried out, and it is recorded on HDD 121 and 141 or Information Storage Division playback equipment 140 (information reproducing device 122). The information currently recorded on HDD 121 and 141, Information Storage Division playback equipment 140, and the information reproducing device 122 is elongated, it displays on CRT display 116, or the speaker 129 is driven. The information compression of the audio signal etc. which were inputted from the microphone 128 is carried out, and it records on HDD 121 and 141 or Information Storage Division playback equipment 140.
[0139]Various exclusive boards take charge of compression / extension function of this information. Voice coding and the decryption board 136 perform compression and extension of music and an audio signal, MPEG board 134 performs compression and extension of video (video picture), and the JPEG board 135 is performing compression and extension of the still picture.
[0140]B -- Connection explanation with the external network of a personal computer.
[0141]B-1 -- Network connection explanation using a telephone line.
[0142]The modem 131 is used to carry out Information Transfer Sub-Division outside via the telephone line f. That is, although not illustrated to make telephone connection to the partner point of hope, NCU (Network ControlUnit) transmits a partner point telephone number to a telephone switchboard via the telephone line f. If a telephone line is connected, the serial I/F controller 130 will perform transmission information format conversion and protocol conversion to the information on the I/O data line 146, The RS-232C signal of the digital signal obtained as a result is changed into an analog signal with the modem 131, and it is transmitted to the telephone line f.
[0143]B-2 -- Network connection explanation using IEEE1394.
[0144]The IEEE1394 interface is suitable in transmitting multimedia information, such as a sound, Still Picture Sub-Division, and video, to an external device (not shown).
[0145]With an animation or a sound, if information required in fixed time is sent and it

does not go out, a motion of a picture will be awkward, or a sound breaks off. In order to solve the problem, in IEEE1394, the isochronous transmission mode which data transfer completes every 125 microseconds is adopted. Although mixture of this isochronous transmission and the usual asynchronous transmission is also allowed in IEEE1394, a maximum of 63.5 microseconds and a maximum are decided at the asynchronous transmission time of one cycle. It is because it becomes impossible to guarantee isochronous transmission when this asynchronous transmission time is too long. In IEEE1394, a SCSI command (instruction set) can be used as it is.

[0146]The IEEE1394I/F board 132 is processing the information format conversion for isochronous transmission, an automatic setup of topology like protocol conversion and node setting out, etc. to the information transmitted in PCI bus 133.

[0147]Thus, there is nothing only by transmitting outside by making into the IEEE1394 signal g the information which it has within the personal electronic computing system 110, The IEEE1394I/F board 132 also has the work which changes the IEEE1394 signal g similarly sent from the outside, and is transmitted to PCI bus 133.

[0148]B-3 -- Network connection explanation using LAN.

[0149]Although not illustrated to the local-area information and telecommunications in specific areas, such as inside of a company, a government office, a school, LAN signal h is outputted and inputted through the LAN cable.

[0150]TCP/IP, NetBEUI, etc. exist as a communicative protocol using LAN, and it has an original data packet structure (information format structure) according to various protocols. LAN board 139 performs information format conversion to the information transmitted on PCI bus 133, communication procedure processing with the exterior according to various protocols, etc.

[0151]The procedure and the Information Transfer Sub-Division course in the case of changing into LAN signal h the specific file information currently recorded in HDD121 as an example, and transmitting to an external personal computer, EWS, or a network server (not shown) are explained. Make the file directory currently recorded by control of IDE controller 120 in HDD121 output, and main CPU111 records the file list of the result on the main memory 112, and it is made to display on CRT display 116. If the file name which a user wants to transmit is inputted keyboard 119, the contents will be recognized by main CPU111 via the keyboard controller 118. If main CPU111 notifies the file name transmitted to IDE controller 120, HDD will judge and access the internal Information Storage Division place, and reproduction information will be transmitted to the I/O data line 146 via IDE controller 120. After file information is inputted into the PCI bus controller 143 from the I/O data line 146, it is transmitted to LAN board 139 via

PCI bus 133. In LAN board 139, after stretching the destination and a session in a series of communication procedure, it transmits to the exterior as LAN signal[after changing file information into the data packet structure which inputted and followed the protocol to transmit from PCI bus 133] h.

[0152]C -- Information Transfer Sub-Division explanation from an information reproducing device or an information storage playback apparatus (optical disk unit).

[0153]C-1 -- A standard interface and the Information Transfer Sub-Division course explanation.

[0154]The information reproducing device 122 and DVD-RAM which are optical disk units only for reproduction, such as CD-ROM and DVD-ROM, When using the Information Storage Division playback equipment 140 which is an optical disc in which record reproduction, such as PD and MO, is possible in the personal electronic computing system 110, incorporating it, "IDE", "SCSI", "IEEE1394", etc. exist as a standard interface.

[0155]Generally, the PCI bus controller 143 and the EISA bus controller 144 have DMA in the inside. Without making main CPU111 intervene by control of DMA, it is between each block and information can be transmitted directly.

[0156]For example, when transmitting the information on Information Storage Division playback equipment 140 to MPEG board 134, the processing from main CPU111 only gives a transfer command to the PCI bus controller 143, and he leaves the Information Transfer Sub-Division management to DMA in a PCI bus controller. As a result, at the time of actual Information Transfer Sub-Division, main CPU is arranged in parallel, without being fascinated by the Information Transfer Sub-Division processing, and can perform other processings.

[0157]Also when transmitting the information currently similarly recorded in the information reproducing device 122 to HDD141, main CPU111 only gives a transfer command to the PCI bus controller 143 or IDE controller 120, He has left next transmission processing management to DMA in the PCI bus controller 143, or DMA in IDE controller 120.

[0158]C-2 -- Attestation (authentication) functional description.

[0159]For the Information Transfer Sub-Division processing about Information Storage Division playback equipment 140 or the information reproducing device 122, as mentioned above, DMA in the PCI bus controller 143, DMA in the EISA bus controller 144, or DMA in IDE controller 120 is managing, but. The actual transmission processing itself is performing transmission processing that the attestation (authentication) function part which Information Storage Division playback equipment

140 or the information reproducing device 122 has is actual.
[0160]In DVD systems, such as DVDvideo, DVD-ROM, and DVD-R, video, The bit stream of the audio is recorded in the MPEG 2 Program stream format, and an audio stream, a video stream, a sub picture stream, a private stream, etc. are intermingled, and it is recorded. Information Storage Division playback equipment 140 at the time of reproduction of information From the program stream (Program stream) to an audio stream. The separated extract of a video stream, a sub picture stream, the private stream, etc. is carried out, and it transmits to the direct sound voice coding decryption board 136, MPEG board 134, or the JPEG board 135 via PCI bus 133, without making main CPU111 intervene.
[0161]The information reproducing device 122 carries out the separated extract of the program stream (Program stream) reproduced from there to various kinds of stream information similarly, Each stream information is directly transmitted to the voice coding decryption board 136, MPEG board 134, or the JPEG board 135 via the I/O data line 146 and PCI bus 133 (without making main CPU111 intervene).
[0162]It has an attestation (authentication) function in the inside at voice coding decryption board 136, MPEG board 134, or JPEG board 135 the very thing as well as Information Storage Division playback equipment 140 or the information reproducing device 122. In advance of Information Transfer Sub-Division, it attests each other via PCI bus 133 (and I/O data line 146) between Information Storage Division playback equipment 140, the information reproducing device 122, the voice coding decryption board 136, MPEG board 134, and the JPEG board 135. If mutual recognition is completed, Information Transfer Sub-Division of the video stream information reproduced with Information Storage Division playback equipment 140 or the information reproducing device 122 will be carried out only to MPEG board 134. Audio stream information is similarly transmitted only to the voice coding decryption board 136. The Still Picture Sub-Division stream is sent to the JPEG board 135, and a private stream and text information are sent to main CPU111.
[0163]Next, in describing concrete working example of this invention, a DVD-RAM disk is used as an information storage medium, and working example explanation at the time of using UDF as File System is given.
[0164]Before describing concrete working example of this invention, explanation about a premised DVD-RAM disk is given.
[0165]Drawing 8 is a figure explaining the layout of the contents of a line score in a DVD-RAM disk.
[0166]namely, the ene BOSUDO data area (Embossed data Zone) where the light

reflection surface carried out uneven shape Lead-in Area 607 by the side of disk inner circumference -- 611. the surface -- flatness (mirror plane) -- the rewritable data zone (Rewritable data Zone) in which mirror zone (Mirror Zone) 612 and rewriting are possible -- it comprises 613. the reference signal zone (Reference signal Zone) where Embossed data Zone 611 expresses a reference signal like drawing 9 -- 653 -- and -- a control data zone (Control data Zone) -- including 655, Mirror Zone 612 contains Connection Zone 657.

[0167]Rewritable data Zone 613, Disk test zone (Disk test Zone)658, Drive test zone (Drive test Zone)660, Disc identification Zone 662 disk ID (identifier) was indicated to be, and defect management area DMA1 and DMA2 663 is included.

[0168]Lead-out Area 609 by the side of a disk periphery, As shown in drawing 10, it is the defect management area DMA3 and DMA4. 691, the disk discernment zone (Disc identification Zone) where disk ID (identifier) was shown -- 692. It comprises rewritable Rewritable data Zone 645 containing Drive test Zone 694 and Disktest Zone 695.

[0169] Data Area 608 between Lead-in Area 607 and Lead-out Area 609 are the shape of 24 annual rings. Zone 00 620 - Zone 23 It is divided into 643. Although each zone (Zone) has fixed revolving speed, revolving speed differs between different zones. The sector numbers which constitute each zone also differ for every zone. Specifically, it is the disk inner circumference side. Zone 00 As for the 620th grade, a composition sector number has little revolving speed early. On the other hand, it is the disk periphery side. Zone 23 Revolving speed is slow and the 643rd grade has many composition sector numbers. According to such a layout, in each zone, rapid access nature like CAV was realized, and if it sees in the whole zone, high-density-recording nature like CLV will be realized.

[0170]Drawing 9 and drawing 10 are the figures explaining the details of Lead-in Area 607 in the layout of drawing 8, and Lead-out Area 609.

[0171]In Control data Zone 655 of Embossed data Zone 611. The book type and part version (Book type and Part version) 671 which shows the types (DVD-ROM, DVD-RAM, DVD-R, etc.) and part version of a DVD standard which are applied, The disk size and minimum lead-out rate (Disc size and minimum read-out rate) 672 which shows disk size and the minimum read-out rate, The disk configuration (Disc structure) 673 which shows the disk structure of an one-layer ROM disk, an one-layer RAM disk, a two-layer ROM disk, etc., Recording DENTISHI (Recording density) 674 which shows storage density, The data location (Data Area allocation) 675 which shows the position on which data is recorded, BCA(Burst Cutting Area) descriptor 676 recorded on the inner circumference side of an information storage medium in the form where the serial number of information-storage-medium each, etc. are not rewritable, Velocity 677 which

shows the linear velocity conditions for the light exposure specification at the time of record, The light exposure to the information storage medium at the time of reproduction is expressed. Read power (Read power) 678, Peak power (Peak power) 679 and showing the maximum exposure value given to an information storage medium for recording mark formation at the time of record, Bias power (Bias power) 680 showing the maximum exposure value given to an information storage medium at the time of elimination and information 682 about manufacture of a medium are recorded.
[0172]When it has another way of speaking, to this Control data Zone 655. The information about the whole information storage medium, such as a physical sector number which shows a recording start and recording end position, Information, including record power, recording pulse width, erase power, reproduction power, the linear velocity at the time of record and elimination, etc., the information about record, playback, and an erasing quality, the information about manufacture of information storage media, such as a serial number of each disk, etc. are recorded a priori.
[0173]To Lead-in Area 607 and Rewritable data Zone 613 of Lead-out Area 609, and 645. The peculiar diskname record section (Disc identificationZone 662, 692) for every medium, A trial recording field (Drive test Zone 660 and Disk test Zone 659 [694 and] which are the objects for the check of record deletion conditions, 695), The management information recording region (defect management area; DMA1&DMA2 663, DMA3&DMA4 691) about the defect region in a data area is provided. By using these fields, the optimal record is attained to each disk.
[0174]Drawing 11 is a figure explaining the details in Data Area 608 in the layout of drawing 8.
[0175]The group (Group) of the same number is assigned for every 24 zone (Zone), and each group contains the pair of User Area 723 used for Data Recording Sub-Division, and SpareArea 724 which are used for alternating processing. the pair of User Area 723 and Spare Area 724 -- every zone -- a guard field (Guard Area) -- it dissociates by 771 and 772. User Area 723 of each group and the spare region (Spare Area) 724 are settled in the zone of the same revolving speed, the one where the group number is smaller belongs to a high velocity revolution zone, and the one where the group number is larger belongs to a low speed rotary zone. Although there are more sector numbers among the groups of a low speed rotary zone than the group of a high velocity revolution zone, since a low speed rotary zone has the large turning radius of a disk, the physical storage density on the disk 10 becomes almost uniform over the whole (all groups) zone.
[0176]In each group, User Area 723 is arranged in the one (that is, on a disk the inner circumference side) where a sector number is smaller, and Spare Area 724 is arranged

in the one (on a disk the periphery side) where a sector number is larger.
[0177]Next, the preparation method of the record signal structure and record signal structure of the information recorded on a DVD-RAM disk as an information storage medium is explained. The contents of the information recorded on a medium themselves call it "information", relation of the state of "1"- "0" after being changed, the structure after carrying out scramble or becoming irregular to the information on an identical content, and expression, i.e., signal aspect, will express it as a "signal", and both will be distinguished suitably.
[0178]Drawing 12 is a figure explaining the structure inside the sector contained in the data area portion of drawing 8. 1 sector 501a of drawing 12 corresponds to one of the sector numbers of drawing 10, and as shown in drawing 13, it has the size of 2048 bytes. Although each sector is not illustrated, it contains at the head the headers 573 and 574 recorded a priori by rugged structure, such as embossing, on the recording surface of an information storage medium (DVD-RAM disk), and it includes the signals 577 and 578 after the synchronization codes 575 and 576 and abnormal conditions by turns.
[0179]Next, the ECC block disposal method in a DVD-RAM disk is explained.
[0180]Drawing 13 is a figure explaining the record unit (ECC unit of Error Correction Code) of the information included in Data Area 608 of drawing 8.
[0181]256 bytes or 512 bytes are made into the minimum unit in FAT (File AllocationTable) mostly used with the file system of the information storage media for personal computers (hard disk HDD, magneto-optical disc MO, etc.). Information is recorded on an information storage medium.
[0182]To it, with information storage media, such as CD-ROM, DVD-ROM, and DVD-RAM, UDF (Universal Disk Format; it mentions later for details) is used as a file system, and information is recorded on an information storage medium by making 2048 bytes into the minimum unit here. This minimum unit is called a sector. That is, to the information storage medium using UDF, as shown in drawing 13, every 2048 bytes of information are recorded and it goes every sector 501.
[0183]In CD-ROM or DVD-ROM, in order to deal with it with a bare disk without using a cartridge, a crack is attached to the information-storage-medium surface on a user side, or garbage adheres to the surface easily. The case where a specific sector (for example, sector 501c of drawing 13) is unreproducible under the influence of garbage or a crack attached to the information-storage-medium surface (or record is impossible) occurs.
[0184]In DVD, the error correcting system (ECC using a product code) in consideration of such a situation is adopted. One ECC (Error Correction Code) block 502 is specifically

constituted from every 16 sectors (drawing 13 16 sectors from the sector 501a to the sector 501p), and the powerful error correction function is given in it. As a result, even if the error in ECC block 502 like a reproduction impossibility arises, the error correction of the sector 501c is carried out, and it becomes possible to reproduce correctly all the information on ECC block 502, for example.

[0185]Drawing 14 is a figure explaining the relation between the zone within Data Area 608 of drawing 8, and a group (refer to drawing 11).

[0186]Each zone of drawing 8: Zone 00620 - Zone 23 643 is what is physically arranged on the recording surface of a DVD-RAM disk, As described to the column and drawing 14 of the physical sector number 604 of drawing 8, it is in Data Area 608. User Area 00 The physical sector number (start physical sector number 701) of the physical sector of the beginning of 705 is set as 031000 h (h: meaning of a hexadecimal number display). A physical sector number increases as it goes to periphery side 704, User Area 00 705 and 01 709 and 23 707 and Spare Area 00 708, 01709, and 23 710 and the number which continued regardless of Guard Area 711, 712, and 713 are given. Therefore, Zone 620-643 is straddled and continuity is maintained at the physical sector number.

[0187]On the other hand, between each Group 714, 715, and 716 which comprises a pair of User Area 705, 706, and 707 and Spare Area 708, 709, and 710, insertion arrangement of Guard Area 711, 712, and 713 is carried out, respectively. Therefore, for the physical sector number which straddled each Group 714, 715, and 716, it has discontinuity like drawing 11.

[0188]When a DVD-RAM disk with the composition of drawing 14 is used with Information Storage Division playback equipment with the Information Storage Division regenerating section (physical system block), The optical head 202 is Guard Area 711, 712, and 713. Processing which changes the revolving speed of a DVD-RAM disk during passage can be performed. For example, the optical head 202 is Group 00. 705 to Group 01 It seeks to 715, and while passing Guard Area 711, the revolving speed of a DVD-RAM disk is changed.

[0189]Drawing 15 is a figure explaining the setting method of the logical sector number within Data Area 608 of drawing 8. The minimum unit of the logical sector has become per 2048 bytes in accordance with the minimum unit of a physical sector. Each logical sector is assigned to the corresponding physical sector position in accordance with the following rules.

[0190]As shown in drawing 14, discontinuity arises for the physical sector number in which Guard Area 711, 712, and 713 is physically formed on the recording surface of a DVD-RAM disk and which accumulated and straddled each Group 714, 715, and 716,

but. A logical sector number is each Group 00. 714 and 01 715 and 23 A setting method which leads to continuation in the position which straddled 716 is taken. This Group 00 714 and 01 715-23 The row of 716, The one (the smaller one of a physical sector number) where the group number is smaller is arranged at the inner circumference side (Lead-in Area 607 side) of a DVD-RAM disk, The one (the larger one of a physical sector number) where the group number is larger is arranged at the periphery side (Lead-out Area 609 side) of a DVD-RAM disk. When there is no defect on the recording surface of a DVD-RAM disk in this arrangement, Each logical sector is drawing 14. User Area 00 705-23 707 It is assigned to all the inner physical sectors 1 to 1, The logical sector number of the sector in start physical sector number 701 position whose physical sector number is 031000h is set as 0 h (see the column of the logical sector number 774 of the sector in Group of each beginning of drawing 11).

[0191]Thus, when there is no defect on a recording surface, it is Spare Area 00. 708-23 A priori to each sector in 710, the logical sector number is not set up.

[0192]It is the prior defect position detection processing on the recording surface performed before record on a DVD-RAM disk. Certifying (Certify) At the time of processing and playback. At or the time of record User Area 00705 - 23 Only the sector number which performed substitute processing as a result of alternating processing when a defect sector was discovered in 707 is Spare Area 00. 708-23 A logical sector number is set up to the corresponding sector in 710.

[0193]Next, some methods of processing the defect produced in user area are explained. Defect management area required for defective processing before that (drawing 9 or the defect management area (DMA1-DMA4 663, 691) of drawing 10, and its related matters are explained.)

[Defect management area] Defect management area (DMA1-DMA4 663, 691) comprises thing data and **** 32 sector including the information on the composition of a data area, and defect management. Two defect management area (DMA1, DMA2 663) is arranged in Lead-inArea 607 of a DVD-RAM disk, Other two defect management area (DMA3, DMA4 691) is Lead-out Area 609 of a DVD-RAM disk. It is arranged inside. Behind each defect management area (DMA1-DMA4 663, 691), the spare sector (spare sector) is added suitably.

[0194]Each defect management area (DMA1-DMA4 663, 691) is divided into two blocks. In the block of the beginning of each defect management area (DMA1-DMA4 663, 691). The defining information structure (DDS; Disc DefinitionStructure) and the primary defect list (PDL; Primary Defect List) of a DVD-RAM disk are contained. A secondary defect list (SDL; Secondary Defect List) is contained in the 2nd block of each defect

management area (DMA1-DMA4 663, 691). Four primary defect lists (PDL) of four defect management area (DMA1-DMA4 663, 691) serve as an identical content, and those four secondary defect lists (SDL) also serve as an identical content.

[0195]Although four defining information structures (DDS) of four defect management area (DMA1-DMA4 663, 691) are identical contents fundamentally, about the pointer to each PDL and SDL of four defect management area, they are respectively individual contents.

[0196]A DDS/PDL block means here the first block containing DDS and PDL. An SDL block means the 2nd block containing SDL.

[0197]The sector of the beginning of :(1) each DDS/PDL block which is as follows contains DDS.;

(2) The 2nd sector of each DDS/PDL block contains PDL.;

(3) The sector of the beginning of each SDL block contains SDL.

[0198]The block length of primary defect list PDL and secondary defect list SDL is determined by each number of entries. By data 0FFh, the unused sector of each defect management area (DMA1-DMA4 663, 691) writes, and is crushed. At 00 h, all the spare sectors write and are crushed.

[Disk defining information] Defining information structure DDS consists of a table of the length for one sector. This DDS has contents which specify the start address of the initializing method of the disk 10, and each PDL and SDL. DDS is recorded on the sector of the beginning of each defect management area (DMA) at the time of the end of initialization of the disk 10.

[Spare sector] The defect sector in each Data Area 608 is replaced by a normal sector by the predetermined defect management method (verification, the slipping shift, skipping shift, linear shift which are mentioned later) (shift). SpareArea 00 which showed drawing 14 the position of the spare sector for this shift 708-23 It is contained in the spare area of each group of 710. The physical sector number in that in each of this Spare Area is written in the column of Spare Area 724 of drawing 11.

[0199]Although a DVD-RAM disk can be initialized before use, this initialization can be performed irrespective of the existence of verification.

[0200]A defect sector Slipping alternating processing (Slipping Replacement Algorithm), It is processed by skipping alternating processing (Skipping Replacement Algorithm) or linear alternating processing (Linear Replacement Algorithm). The sum total of the number of entries listed by said PDL and SDL by these processings (Algorithm) is made into a predetermined number (4092 or less [for example,]).

[Initialization and Certify] Before recording user's information on Data Area 608 of a

DVD-RAM disk, the defective situation of all the sectors in a deed and Data Area 608 is inspected for initialization processing in many cases (Certify). It is specified, it responds to the continuous defective sector number, and the defect sector discovered by the initialization stage is slipping alternating processing or linear alternating processing. UserArea 723 An inner defect sector is interpolated by the spare sector in Spare Area 724. When the spare sector in a zone of a DVD-RAM disk has been used up during execution of Certify, it shall judge with the DVD-RAM disk being faulty, and the DVD-RAM disk shall not be used henceforth.

[0201]The parameter of all the defining information structure DDS is recorded on four DDS sectors. Primary defect list PDL and secondary defect list SDL are recorded on four defect management area (DMA1-DMA4 663, 691). By the first initialization, the update counter in SDL is set to 00 h, and all the reservation blocks are written and crushed at 00 h.

[0202]When using the disk 10 for the data storage of a computer, the above-mentioned initialization and Certify are performed, but video recording can be carried out suddenly, without performing the above-mentioned initialization and Certify, when used for video recording.

[0203]Drawing 16 (a) and (b) is Data Area 608 of drawing 8. It is a figure explaining the slipping alternating processing (Slipping Replacement Algorithm) inside.

[0204]Immediately after DVD-RAM disk manufacture (when no user's information is recorded on the disk yet), Or when recording user's information first, this slipping alternating processing is applied as a defective disposal method (if overwrite record is carried out on the place already recorded, when there is nothing and it records information on a non-record section first).

[0205]That is, shift (or substitution) use of the discovered defective data sector (for example, m defect sectors 731) is carried out at the first normal sector (user area 723b) that continues after the defect sector (alternating processing 734). Thereby, slipping for m sector (logical sector number back shift) arises toward an applicable group's end. If the n defect sectors 732 are discovered after that, shift use will be carried out with the normal sector (user area 723c) which continues after that, and, similarly the setting-out position of a logical sector number will shift the defect sector back. Result Spare Area724 of the alternating processing A logical sector number is set as m+n sector part 737 from the inner beginning, and it becomes a user Information Storage Division feasible region. As a result, the non-use fields 726 in Spare Area 724 decrease in number by a m+n sector.

[0206]The address of the defect sector at this time is written in a primary defect list

(PDL), and a defect sector is forbidden record of User Information. When a defect sector is not discovered in Certify, nothing is written in PDL. It is Spare Area 724 to the appearance. When a defect sector is discovered also in the inner record usage region 743, the address of the spare sector is also written in PDL.

[0207]The record usage region 743 in User Area 723a - 723c without a defect sector and Spare Area 724 serves as the group's Information Storage Division use portion (logical sector number set area 735) as a result of the above-mentioned slipping alternating processing, The logical sector number which followed this portion is assigned.

[0208]Drawing 16 (c) is a figure explaining the skipping alternating processing (Skipping Replacement Algorithm) which are other alternating processings within Data Area 608 of drawing 8.

[0209]Skipping alternating processing is a disposal method suitable for the defective processing in the case of recording user's information continuously (seamless), without video information, speech information, etc. breaking off. This skipping alternating processing is performed per 16 sector units, i.e., ECC block, (since one sector is 2 K bytes, it is a 32-K byte unit).

[0210]For example, if one defective ECC block 741 is discovered after User Area 732a which comprises a normal ECC block, The data which was due to be recorded on this defective ECC block 741 is [next] normal. It is instead recorded on the ECC block of User Area 723b (alternating processing 744). If k continuous defective ECC blocks 742 are discovered similarly, the data which was due to be recorded on these defective blocks 742 is [next] normal. It is instead recorded on k ECC blocks of User Area 723c.

[0211]In this way, when 1+k defective ECC blocks are discovered within an applicable group's User Area, (1+k) It is postponed by the amount of ECC block in the field of Spare Area 724, the extension region 743 used for Information Storage Division in Spare Area 724 turns into a user Information Storage Division feasible region, and a logical sector number is set up here. As a result, the non-use fields 726 of Spare Area 724 decrease in number by an ECC block (1+k), and the remaining non-use fields 746 become small.

[0212] User Area 723a - 723c without a defective ECC block and the extension region 743 used for Information Storage Division serve as the Information Storage Division use portion (logical sector number set area) within the group as a result of the above-mentioned alternating processing. As a setting method of the logical sector number at this time, User Area 723a - 723c without a defective ECC block has the big feature in the place kept eternal [as / the logical sector number assigned a priori at the time of initial setting (before the above-mentioned alternating processing)].

[0213]As a result, the logical sector number assigned a priori to each physical sector in defective ECC block 741 at the time of initial setting is moved and set as the physical sector of the beginning in the extension region 743 used for Information Storage Division as it is. The logical sector number assigned to each physical sector in k piece continuation defective ECC block 742 at the time of initial setting carries out parallel translation as it is, and is set as each applicable physical sector in the extension region 743 used for Information Storage Division.

[0214]In this skipping alternating processing method, even if Certify of the DVD-RAM disk is not carried out a priori, alternating processing can be immediately performed to the defect sector discovered in user Information Storage Division.

[0215]Drawing 16 (d) is a figure explaining the linear alternating processing (Linear Replacement Algorithm) which is the alternating processing of further others within Data Area 608 of drawing 8.

[0216]This linear alternating processing is also performed per 16 sector units, i.e., ECC block, (32-K byte unit). In linear alternating processing, defective ECC block 751 takes the place of an usable normal spare block (shift recording part 753 of the beginning in Spare Area 724) first within an applicable group (alternating processing 758). (substitution) In the case of this alternating processing, the user's information which was due to be recorded on defective ECC block 751 is Spare Area 724 as it is. It is recorded on the inner shift recording part 753, and a logical sector number setting-out position is also moved on the shift recording part 753 as it is. The user's information and the logical sector number setting-out position which were due to be recorded to k continuation defective ECC blocks 752 similarly. Spare Area 724 It moves to the inner shift recording part 754.

[0217]In the case of linear alternating processing and skipping alternating processing, the address of a defective block and the address of the last shift (substitution) block are written in at SDL. When the exchange block by which the SDL (secondary defect list) rise was carried out turns out to be a defective block behind, it registers with SDL using the direct pointer method. In this direct pointer method, the entry of SDL into which the changed defective block is registered is corrected by changing the address of an exchange block into a new thing from the thing of a defective block. When updating the above-mentioned secondary defect list SDL, one updating counter in SDL is **********ed.

[0218][Writing processing] When performing data write into a certain group's sector, the defect sector listed by the primary defect list (PDL) is skipped. And according to the slipping alternating processing mentioned above, the data which it tries to write in a

defect sector is written in the data sector which comes to the next. If the write object block is listed by the secondary defect list (SDL), the data which it tries to write in the block will be written in the spare block directed by SDL according to the linear alternating processing mentioned above or skipping alternating processing.

[0219]Under the environment of a personal computer, linear alternating processing is used at the time of record of personal computer filing, and skipping alternating processing is used at the time of record of an AV file.

[primary defect list ;P DL] The contents may be empty although a primary defect list (PDL) is always recorded on a DVD-RAM disk.

[0220]PDL includes the address of all the defect sectors specified at the time of initialization. These addresses are listed by the ascending order. PDL is recorded with a necessary minimum sector number. And PDL is started from the user byte of the beginning of the first sector. All the unused bytes in the final sector of PDL are set to 0FFh. In this PDL. contents 0 of :byte-position PDL in which the following information will be written 00 h;PDL identifier 1 adress-numbers [in 01 h;PDL identifier 2 PDL]; -- adress-numbers [in MSB 3 PDL]; -- address (sector number; MSB) of the defect sector of the LSB 4 beginning

5 The address of the first defect sector (sector number)

6 The address of the first defect sector (sector number)

7 The address (sector number; LSB) of the first defect sector

-- -- x-3 Address (sector number; MSB) of the last defect sector

x-2 Address of the last defect sector (sector number)

x-1 Address of the last defect sector (sector number)

The address (sector number; LSB) of the defect sector of the x last

* Notes; the 3rd byte becomes an end of PDL when the 2nd byte and the 3rd byte are set to 00 h.

[0221]In the case of the primary defect list (PDL) to a multisector, the address list of a defect sector follows the byte of the beginning of the succession sector of the 2nd henceforth. That is, a PDL identifier and PDL adress numbers exist only in the first sector.

[0222]When PDL is empty, the 2nd byte and the 3rd byte are set to 00 h, and the 4th byte thru/or the 2047th byte are set to FFh.

[0223]FFh is written in the unused sector within a DDS/PDL block.

[0224][-- secondary defect list; -- SDL] -- a secondary defect list (SDL) is generated by an initialization stage, and is used after Certify. SDL is recorded during initialization by all the disks.

[0225]This SDL is a form of the address of the spare block of which the address of a defective data block and this defective block are relieved, and includes two or more entries. 8 bytes is assigned to each entry in SDL. That is, 4 bytes of them are assigned to the address of a defective block, and the remaining 4 bytes are assigned to the address of the exchange block.

[0226]The above-mentioned address list includes the address of the beginning of a defective block and its exchange block. The address of a defective block is given to an ascending order.

[0227]SDL is recorded with a necessary minimum sector number, and this SDL begins from the user-datum byte of the beginning of the first sector. All the unused bytes in the final sector of SDL are set to 0FFh. Subsequent information is recorded on four SDLs of each.

[0228]When the exchange block listed by SDL turns out to be a defective block behind, it registers with SDL using the direct pointer method. In this direct pointer method, the entry of SDL into which the changed defective block is registered is corrected by changing the address of an exchange block into a new thing from the thing of a defective block. In that case, the number of entries in SDL is not changed by a degradation sector.

[0229]Contents 0 of :byte-position SDL by which the following information will be written in this SDL (00);SDL identifier 1 (02);SDL identifier 2 (00)

3 (01)

4 updating counter; -- renewal counter [of renewal counter of renewal counter of MSB 5 6 7]; -- LSB 8-26 reserve (00h)

27-29 Number of entries;LSB 32 in number of entries;MSB 31 SDL in flag 30 SDL which shows that all the spare sectors in a zone were used up Address of the first defective block (sector number; MSB)

33 The address of the first defective block (sector number)

34 The address of the first defective block (sector number)

35 Address of the first defective block (sector number; LSB)

36 Address of the first exchange block (sector number; MSB)

37 The address of the first exchange block (sector number)

38 The address of the first exchange block (sector number)

39 Address of the first exchange block (sector number; LSB)

-- -- y-7 Address of the last defective block (sector number; MSB)

y-6 The address of the last defective block (sector number)

y-5 The address of the last defective block (sector number)

y-4 Address of the last defective block (sector number; LSB)

y-3 Address of the last exchange block (sector number; MSB)
y-2 The address of the last exchange block (sector number)
y-1 The address of the last exchange block (sector number)
Address of the exchange block of the y last (sector number; LSB)
* notes; -- the 30- the 31st byte of each entry -- 8-byte length.
[0230]In the case of the secondary defect list (SDL) to a multisector, the address list of a defective block and an exchange block follows the byte of the beginning of the succession sector of the 2nd henceforth. That is, the 0th byte - the 31st byte of the contents of the above-mentioned SDL exist only in the first sector. FFh is written in the unused sector within an SDL block.
[0231]An example of the setting-operation of a logical block number to a DVD-RAM disk etc. is explained.
[0232]When the turntable 221 is loaded with the information storage medium (optical disc) 201, the control section 220 makes rotation of the spindle motor 204 start.
[0233]One [after information-storage-medium (optical disc) 201 rotation begins, the laser emission of the optical head 202 is started, and / the focus servo loop of the object lens in the optical head 202].
[0234]After laser light emitting, the control section 220 operates the feed motor 203, and is moved to Lead-in Area 607 of the information storage medium (optical disc) 201 whose optical head 202 is under rotation. And one [the track servo loop of the object lens in the optical head 202].
[0235]If a track servo becomes active, the optical head 202 will play the information on Control data Zone 655 in Lead-in Area 607 of the information storage medium (optical disc) 201. By reproducing Book type and Part version 671 in this Control data Zone 655. It is checked that it is a medium (a DVD-RAM disk or a DVD-R disk) which the information storage medium (optical disc) 201 rotated now can record. Here, suppose that the medium 10 is a DVD-RAM disk.
[0236]If it is checked that the information storage medium (optical disc) 201 is a DVD-RAM disk, the information on the optimal light volume at the time of playback, record, and elimination (emission power and a light emission period, or a duty ratio of a semiconductor laser, etc.) will be played from Control data Zone 655 of a reproduction object.
[0237]Then, the control section 220 creates the conversion table of a physical sector number and a logical sector number as what does not have a defect in the DVD-RAM disk 201 under present rotation.
[0238]After this conversion table was created, The control section 220 is Lead-in Area

607 of the information storage medium (optical disc) 201. Inner defect management area DMA1/DMA2 663 and defect management area DMA3/DMA4 in Lead-out Area 609 691 is played, The defect distribution of the information storage medium 201 at the time (optical disc) is investigated.

[0239]If the above-mentioned defect distribution investigation shows the defect distribution on the information storage medium (optical disc) 201, the control section 220 will correct the conversion table created as "there is no defect" according to actual defect distribution by step ST140. The logical sector number LSN which is a portion of each sector which specifically turned out for there to be a defect, and supported physical sector number PSN is shifted.

[0240]Next, an example of the defective processing operation (processing by the side of a drive) in a DVD-RAM disk etc. is explained. The file size of the head logical block number LBN of information and recorded information recorded on the medium (for example, DVD-RAM disk) 201 with which the present drive is loaded is first specified to MPU in the control section 220. Then, MPU of the control section 220 computes the head logical sector number LSN of the information to record from the specified head logical block number LBN. In this way, the write-in logical sector number from the computed file size which head-logical-sector-number-LSN(ed) and was specified to the information storage medium (optical disc) 201 becomes settled.

[0241]Next, MPU of the control section 220 investigates the defect on the disk 201 while writing a recording information file in the appointed address of the DVD-RAM disk 201.

[0242]If a defect is not detected during this file writing, it means that the recording information file was recorded that there are no abnormalities in a predetermined logical sector number (that is, ** which an error does not generate), and recording processing is completed normally.

[0243]On the other hand, if a defect is detected during file writing, it will be predetermined alternating processing (for example, linear alternating processing (Linear Replacement Algorithm) is performed.). The newly detected defect is DMA3/DMA4 of DMA1/DMA2663 and Lead-out Area 609 of Lead-in Area 607 of a disk after this alternating processing. Additional registration is carried out to 691. DMA1/DMA2 to the information storage medium (optical disc) 201 663 and DMA3/DMA4 After the additional registration of 691, and these DMA1/DMA2 663 and DMA3/DMA4 The contents of the conversion table are corrected based on the contents of registration of 691.

[0244]Next, UDF which is a kind of File System is explained below, next drawing 22 explains UDF which is a kind of File System from drawing 17.

[0245][A-1] -- UDF is the abbreviation for universal disc format (Universal Disk Format), and "the agreement about a file management method" in a disk-like information storage medium is mainly shown. CD-ROM, CD-R, CD-RW, DVD-Video, DVD-ROM, DVD-R, and DVD-RAM have adopted the UDF format standardized by "ISO9660."

[0246]As a file management method, it has root directory (Root Directory) in parents fundamentally, and is premised on the hierarchical file structure which manages a file to tree form. Although explanation about the UDF format mainly based on the DVD-RAM standard (File System Specifications) is given here, many portions of this explanation content are in agreement also with the contents of a DVD-ROM standard.

[0247][A-2] -- When recording information on the file information record contents information storage to the outline [A-2-1] information storage medium of UDF, a settlement of information is called "file data" (FileData) and it records per file data. In order to discriminate from other file data, the original file name is added for every file data. If grouping is carried out for every two or more file data with common information content, file management and file search will become easy. The group for every two or more file data of these is called a "directory" (Directory) or a "holder" (Folder). An original directory name (folder name) is added to each directory (holder) of every. Two or more of the directories (holder) can be collected, and it can collect by the directory (higher rank holder) of a higher rank as a group of the hierarchy on it. Here, file data and a directory (holder) are generically called the file (File).

[0248]In recording information, it records all the information related without the preservation place (under which directory does it record?) of information content of * file data itself, the file name corresponding to * file data, and * file data on an information storage medium.

[0249]All also of * directory name (folder name) to each directory (holder) and the information related without the position (position of the superior directory (higher rank holder) which serves as the parents) to which * each directory (holder) belongs are recorded on the information storage medium.

[0250][A-2-2] All the record sections on the Information Storage Division format information storage on an information storage medium are divided into the logical sector which makes 2048Bytes the minimum unit, and the logical sector number is attached to all the logical sectors by consecutive numbers. When recording information on an information storage medium, information is recorded in this logical sector unit. The recording position on an information storage medium is managed by the logical sector number of the logical sector which recorded this information.

[0251]it is shown in drawing 17 and drawing 18 -- as -- file organization (File Structure) -- especially the logical sector on which the information about 486 and file data (File Data)487 is recorded also being called a "logical block", and, A logical sector number (LSN) is interlocked with and the logical block number (LBN) is set up. (The length of the logical block is 2048Bytes like the logical sector.)

[A-2-3] An example which simplified an example hierarchical file system which simplified the hierarchical file structure is shown in drawing 19 (a). The file manager system of almost all OS's, such as UNIX, MacOS, MS-DOS, and Windows, has a tree form layered structure as shown in drawing 19 (a). One root directory (Root Directory)401 which becomes parents of the whole exists in every one disk drive (for example, when one set of HDD is divided into two or more partitions, each partition unit is shown), Subdirectory (SubDirectory)402 belongs to the bottom of it. File Data403 exists in this SubDirectory 402.

[0252]Actually, File Data 403 may exist directly in the bottom not only of this example but Root Directory 401, or two or more SubDirectory 402 may have the complicated layered structure connected in series.

[0253][A-2-4] The record content file management information of information-storage-medium top file management information is recorded in the logical block unit mentioned above. Descriptive text FID (file identification descriptor; File Identifier Descriptor) the contents recorded in each logical block mainly indicate the information about * file to be -- the kind of file, and a file name (a Root Directory name.) A SubDirectory name, a File Data name, etc. are described.

[0254]-- The recording position of the descriptive text (that is, FE explained to the following corresponding to an applicable file) which shows the recording place of the data content of File Data which continues into FID at it, and the contents of Directory is also described.

[0255]* Descriptive text FE which shows the recording position of file contents (file entry; FileEntry)

-- The data content of File Data, the position (logical block number) on the information storage medium with which the information about the contents of Director(ies) (Sub Directory etc.) is recorded, etc. are described.

[0256]The extract of the descriptive content of File Identifier Descriptor was shown in drawing 24 (it mentions later). The detailed explanation is given by "[4 [B-]] File Identifier Descriptor." The extract of the descriptive content of File Entry is shown in drawing 23 (it mentions later), and the detailed explanation is given by "[3 [B-]] File Entry."

[0257]Next, the descriptive text which shows the recording position on an information storage medium, It is shown in drawing 20. The short allocation descriptor (Short Allocation Descriptor) shown in long allocation descriptor (Long Allocation Descriptor) and drawing 21 is used. Each detailed explanation is performed by "[B-1-2] Long Allocation Descriptor" and "[B-1-3] Short Allocation Descriptor."

[0258]The contents of record when the information on the file system organization of drawing 19 (a) is recorded on an information storage medium as an example are shown in drawing 19 (b). The contents of record of drawing 19 (b) become as follows.

- The contents of Root Directory 401 are shown in the logical block of the logical block number "1."

[0259]-- Since only Sub Directory 402 is contained in Root Directory 401 in the example of drawing 19 (a), The information about Sub Directory 402 has indicated in the File Identifier Descriptor sentence 404 as contents of Root Directory 401. Although not illustrated, the account of the average also of the information on Root Directory 401 self has been carried out in FileIdentifier Descriptor sentence into the same logical block.

[0260]-- File of this Sub Directory 402. Identifier Descriptor sentence . To inside, 404 Sub Directory. The recording position (the example of drawing 19 (b) 2nd logical block) of the File Entry sentence 405 which shows where the contents of 402 are recorded is indicated by Long Allocation Descriptor sentence (LAD (2)).

- The File Entry sentence 405 which shows the position on which the contents of Sub Directory 402 are recorded is recorded on the logical block of the logical block number "2."

[0261]-- Since only File Data 403 is contained in Sub Directory 402 in the example of drawing 19 (a), Substantially, the recording position of the File Identifier Descriptor sentence 406 where the information about File Data 403 is described will be shown as contents of Sub Directory 402.

[0262]-- It is described that the contents of Sub Directory 402 are recorded on the 3rd logical block in ShortAllocation Descriptor sentence in a File Entry sentence (AD (3)).

- The contents of Sub Directory 402 are recorded on the logical block of the logical block number "3."

[0263]-- Since only File Data 403 is contained in Sub Directory 402 in the example of drawing 19 (a), The information about File Data403 is indicated by File Identifier Descriptor sentence 406 as contents of Sub Directory 402. Although not illustrated, it is in the same logical block. Sub Directory402 The account of the average also of the own information has been carried out in the File Identifier Descriptor sentence.

[0264]-- File about File Data 403. The recording position (in the example of drawing 19

(b), recorded on the 4th logical block) of FileEntry sentence 407 which shows the position in which the contents of the File Data 403 are recorded in Identifier Descriptor sentence 406 where, It is indicated by the Long Allocation Descriptor sentence (LAD (4)).
- The File Entry sentence 407 which shows the position on which the File Data 403 contents 408 and 409 are recorded is recorded on the logical block of the logical block number "4."
[0265]--File Entry sentence 407 What the File Data 403 contents 408 and 409 are recording on the 5th and the 6th logical block in inner Short Allocation Descriptor sentence is described (AD (5), AD (6)).
- It is File Data 403 to the logical block of a logical block number "5". The contents information (a) 408 is recorded.
- It is File Data 403 to the logical block of a logical block number "6". The contents information (b) 409 is recorded.
[A-2-5]
As briefly explained with the accessing method "contents of file system Information Storage Division on [A-2-4] information storage medium" to File Data in alignment with the drawing 19 (b) information. To File Identifier Descriptor 404, 406 and File Entry405, and 407, the logical block number the information following it is described to be is described. The same with reaching from Root Directory, to File Data via SubDirectory, while getting down from a hierarchy, It accesses to the data content of File Data, reproducing the information in the logical block on an information storage medium one by one according to the logical block number described in File Identifier Descriptor and File Entry.
[0266]That is, in order to access to File Data 403 to the information shown in drawing 19 (b), the 1st logical block information is read first. Since File Data 403 exists in Sub Directory 402, After looking for File Identifier Descriptor 404 of Sub Directory 402 out of the 1st logical block information and reading LAD (2), the 2nd logical block information is read according to it. Since only one File Entry sentence is described to the 2nd logical block, AD (3) in it is read and it moves to the 3rd logical block. In the 3rd logical block, File Identifier Descriptor 406 described about File Data 403 is looked for, and LAD (4) is read. Since only the one FileEntry sentence 407 will be described there if it moves to the 4th logical block according to LAD (4), AD (5) and AD (6) are read and the logical block number (the 5th and the 6th) on which the contents of File Data 403 are recorded is found. "Concrete contents explanation of each descriptive text (Descriptor) of [B] UDF" explains the contents of AD (*) and LAD (*) in detail.
[A-3] Comparison with FAT currently used below for the feature [A-3-1] UDF feature

explanation of UDF by HDD, FDD, MO, etc. explains the feature of UDF.
1) (the minimum logic block size, the minimum logic sector size, etc.) The minimum unit is large and it is fit for the record of video information with much amount of information, or music information which should be recorded.
[0267]-- The logic sector size of FAT is as large [the logical sector (block) size of UDF] as 2048Bytes to 512Bytes.
2) FAT can carry out distributed record of the file management information in UDF at the arbitrary positions on a disk to intensive record of the quota control table (File AllocationTable) to the information storage medium of a file being locally carried out on an information storage medium.
[0268]-- By UDF, the recording position on the disk about file management information or file data is described by Allocation Descriptor as a logical sector (block) number.
[0269]* Since central control is carried out in FAT in the file management area (File Allocation Table), it is a use frequently to be changed [of a file structure]. It is suitable for [the mainly frequent rewriting use] (since it is recorded on the concentration part and is easy to rewrite management information). Since the recording place of file management information (File Allocation Table) was decided beforehand, the high reliability (there are few defect regions) of a recording medium will be the requisite.
[0270]* The use to which a large change of a file structure adds a file structure few and later new in the portion (it is mainly a portion below Root Directory) under a hierarchy, and goes since file management information is distributed in UDF It is suitable for [Lord at postscript use] (since there are few changed parts to former file management information at the time of a postscript). Since the recording position of the distributed file management information can be specified arbitrarily, a native rejected region can be avoided and recorded.
[0271]Since all the file management information is brought together in one place, and is recorded, since file management information is recordable on arbitrary positions, and the advantage of the above-mentioned FAT can also be taken out, a file system with higher flexibility can be considered.
As shown in descriptive text [B-1-1] Allocation Descriptor "contents of file system Information Storage Division on [A-2-4] information storage medium" of the concrete contents explanation [B-1] logical-block number of each descriptive text (Descriptor) of UDF, [B] File. It is contained in the parts of Identifier Descriptor, File Entry, etc., and the descriptive text which showed the position (logical block number) on which the information which continues after that is recorded is called Allocation Descriptor. There are Long Allocation Descriptor and Short Allocation Descriptor which are shown below

in Allocation Descriptor.
[B-1-2] As shown in Long Allocation Descriptor drawing 20, it is length 410 of - extent (Extent). -- The number of logical blocks is displayed by 4Bytes, - Position 411 of Extent -- They are a display and - yne premen tension (Implementation Use) 412 at 4Bytes about an applicable logical block number. -- It is constituted from a display etc. by the information used for data processing at 8Bytes. In the explanatory note here, description is simplified and "LAD (logical block number)" describes.
[B-1-3] As shown in Short Allocation Descriptor drawing 21, it is length 410 of -Extent. -- It is the position 411 of a display and -Extent at 4Bytes about the number of logical blocks. -- A display and a chisel constitute an applicable logical block number from 4Bytes. In the explanatory note here, description is simplified and "AD (logical block number)" describes.
[B-2] ANROKEITEDDO space entry (Unallocated Space Entry)
It is SpaceTable (refer to drawing 17 and drawing 18) at the descriptive text which describes " Extent distribution of a sheep recorded state" on an information storage medium by Short Allocation Descriptor for every Extent as shown in drawing 22, and puts it in order. It is used. As concrete contents, it is -Descriptor Tag 413. -- The identifier of a descriptive content is expressed, In this case, "263", -ICB Tag 414 --. A file type is shown. File Type=1 in ICB Tag means Unallocated Space Entry, and Directory and File Type=5 express File Data File Type=4.
- Overall-length 415 of an Allocation Descriptors sequence -- 4Bytes shows the total Bytes number. **** is described.
[B-3] The descriptive text explained by File Entry "contents of file system Information Storage Division on [A-2-4] information storage medium."
[0272]As shown in drawing 23, it is - descriptor tag (Descriptor Tag)417. -- The identifier of a descriptive content is expressed, In this case, "261" and -ICB Tag 418 -- the contents of -> which show a file type -- [B-2] -- the same. - Permission (Permissions)419 --. Record and reproduction / deletion permit information according to user is shown. -Allocation Descriptors 420 mainly used for the purpose of security reservation of a file --. For every Extent, put Short Allocation Descriptor in order and describe the position on which the contents of the applicable file are recorded. **** is described.
[B-4] The descriptive text which described file information that File Identifier Descriptor "contents of file system Information Storage Division on [A-2-4] information storage medium" explained.
[0273]As shown in drawing 24, it is -Descriptor Tag 421. -- The identifier of a descriptive

content is expressed, In this case, "257", the - file feature (File Characteristics) 422 -- An example, Parent Directory, Directory, File Data, or a file deletion flag is meant for the classification of a file.
- Information-control block (Information Control Block) 423 -- FE position corresponding to this file is described by Long Allocation Descriptor.
- File Identifier 424 -- A directory name or file name.
- Padding 437 -- In the dummy area added in order to adjust the length of whole File Identifier Descriptor, "0" is usually recorded altogether. **** is described.
[0274][C] Explain below the contents shown in the example of file structure description "[2 [A-]] Outline of UDF" recorded on the information storage medium according to UDF in detail using a concrete example.
[0275]The more general example of a file system organization is shown in drawing 25 to drawing 19 (a). The inside of a parenthesis shows the logical block number on the information storage medium with which the data content of the information about the contents of Directory or File Data is recorded.
[0276]The example which recorded the information on the file system organization of drawing 25 on the information storage medium according to the UDF format is shown in the file organization (File Structure) 486 of drawing 17 and drawing 18.
[0277]It is the * space bit map (Space Bitmap) method as a non-recording position controlling method on an information storage medium. --. Used Space Bitmap Descriptor 470. The flag which "is not recorded" is set in bit map to all the logical blocks of the record section in an information storage medium. ["finishing / record /" or]
* The space table (Space Table) method -- All the unrecorded logical block numbers are indicated as a listing of Short Allocation Descriptor using the recording mode of Unallocated Space Entry 471. ** 2 method exists.
[0278]In explanation of this embodiment, although the formula is both purposely written together to drawing 17 and drawing 18 for explanation, most things for which both are used together actually (recorded on an information storage medium) cannot be found, and only either is used.
[0279]The outline of the contents of the main Descriptor(s) described by drawing 17 and drawing 18 is as follows.
- Beginning Extended Area Descriptor 445 -- The starting position of Volume Recognition Sequence is shown.
- Volume Structure Descriptor 446 -- Contents explanation of Volume is described, - Boot Descriptor 447 -- The contents of processing at the time of boot are described, - Terminating Extended Area Descriptor 448 -- -Partition Descriptor 450 which shows the

end position of Volume Recognition Sequence -- Partition information (size etc.) is shown.
[0280]In DVD-RAM, it carries out the principle [1 partition (Partition)] per 1Volume.
- Logical Volume Descriptor 454 --. Have described the contents of logical volume. - Anchor Volume Descriptor. Pointer 458 -- The recording position of MainVolume Descriptor Sequence 449 [in an information-storage-medium record section] and Main Volume Descriptor Sequence 467 is shown.
- Reserved (all 00h bytes) 459-465 -- In order to secure the logical sector number which records specific Descriptor, the coordination area which recorded "0" altogether between them is given.
- Reserve Volume Descriptor Sequence 467 -- Main Volume Descriptor. The pack rise field of the information recorded on Sequence 449.
[0281][D] Explain the access processing method on the information storage medium for reproducing the data content of File DataH432 (refer to drawing 25), using the file system information shown in accessing method drawing 17 to the file data at the time of reproduction, and drawing 18.
1) Go the information on Boot Descriptor 447 in Volume Recognition Sequence 444 field to reproduce as a boot (Boot) field at the time of the Information Storage Division playback equipment starting or information-storage-medium wearing.
2) In accordance with the descriptive content of Boot Descriptor 447, the processing at the time of boot (Boot) starts. When there is no processing at the time of the boot specified especially, the order (Main VolumeDescriptor Sequence) of introduction main BORIUMU description -- 449 -- inside of a field a logic BORIUMU descriptor (Logical VolumeDescriptor) -- the information on 454 is reproduced.
3) inside of Logical Volume Descriptor 454 a logic BORIUMU contents youth (Logical Volume Contents Use) -- 455 being described and, There, File set descriptor (File Set Descriptor) 472 records. The logical block number which shows a certain position is described in Long AllocationDescriptor (drawing 20) form (in the example of drawing 17 and drawing 18, it has recorded on the 100th logical block from LAD (100)).
4) Access the 100th logical block (by a logical sector number, it becomes the 372nd), and reproduce File Set Descriptor 472. Root Directory ICB in it. 473 the place (logical block number) where it is alike and File Entry about Root Directory A 425 is recorded describing in Long Allocation Descriptor (drawing 20) form, and. It is (in the example of drawing 17 and drawing 18, it has recorded on the 102nd logical block from LAD (102)).
[0282]According to LAD (102) of Root Directory ICB 473, 5) Access the 102nd logical block and reproduce File Entry 475 about Root Directory A 425, The position (logical

block number) on which the information about the contents of Root Directory A 425 is recorded is read (AD (103)).
6) Access the 103rd logical block and reproduce the information about the contents of Root Directory A 425.
[0283]File Data H 432 is Directory D 428. Since it exists under a series, File Identifier Descriptor about Directory D 428 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (110)) on which File Entry about Directory D 428 is recorded is read.
7) Access the 110th logical block, reproduce File Entry 480 about Directory D 428, and read the position (logical block number) on which the information about the contents of Directory D 428 is recorded (AD (111)).
8) Access the 111st logical block and reproduce the information about the contents of Directory D 428.
[0284]Since File Data H 432 exists in the bottom of SubDirectory F 430 directly, File Identifier Descriptor about SubDirectory F 430 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (112)) on which File Entry about SubDirectory F430 is recorded is read.
9) Access the 112nd logical block and File Entry 482 about SubDirectory F 430 is reproduced, The position (logical block number) on which the information about the contents of SubDirectory F 430 is recorded is read (AD (113)).
10) Access the 113rd logical block, reproduce the information about the contents of SubDirectory F 430, and look for File Identifier Descriptor about File Data H 432. And the logical block number (although not illustrated to drawing 17 and drawing 18 LAD (114)) on which File Entry about File Data H 432 is recorded is read in there.
11) Access the 114th logical block and read the position which reproduces File Entry 484 about File Data H 432 and on which data content 489 of File Data H 432 is recorded.
12) Reproduce information from an information storage medium to the logical block numerical order described in File Entry 484 about File Data H 432, and read the data content 489 of File Data H 432.
[0285][E] Explain a disposal method also including access in the case of changing the data content of File DataH 432, using the file system information shown in specific file data Make Changes method drawing 17 and drawing 18.
1) Search for the capacity difference of the data content in the change order of File Data H 432, break the value by 2048Bytes, and although the data after change is recorded, calculate a priori whether how many piece addition use of the logical block is carried out, or how many piece needlessness it becomes.

2) Go the information on Boot Descriptor 447 in Volume Recognition Sequence 444 field to reproduce as a boot (Boot) field at the time of the Information Storage Division playback equipment starting or information-storage-medium wearing. In accordance with the descriptive content of Boot Descriptor 447, the processing at the time of boot (Boot) starts.

[0286]When there is no processing at the time of the boot specified especially, Partition Descriptor 450 in Main Volume Descriptor Sequence 449 field is reproduced at the beginning of three, The information on Partition Contents Use 451 described in it is read. The recording position of Space Table or Space Bitmap is shown in this Partition Contents Use 451 (it is also called Partition Header Descriptor).

- The Space Table position is described by the column of Unallocated Space Table 452 in the form of Short AllocationDescriptor (the example of drawing 18 drawing 17, AD (50)).

-Space Bitmap position is described by the column of Unallocated Space Bitmap 453 in the form of Short Allocation Descriptor. (The example of drawing 18 drawing 17, AD (0))

4) Access to the logical block number (0) Space Bitmap read by 3 is described to be. Space Bitmap information is read in Space Bitmap Descriptor 470, an unrecorded logical block is looked for and use of the logical block for the calculation result of 1 is registered (rewriting processing of Space Bitmap Descriptor 460 information). Or it accesses to the logical block number (50) Space Table read by 4'3 is described to be. an unrecorded logical block is looked for from USE (AD (*), AD (*), --, AD (*)) 471 of Space Table, and use of the logical block for the calculation result of 1 is registered.

[0287](Rewriting processing of Space Table information)

* Actual processing performs "4", "4'", and one of processings.

5) Next, Main Volume Descriptor Sequence 449 The information on Logical Volume Descriptor 454 in a field is reproduced.

6) Logical Volume Contents Use 455 is described in Logical Volume Descriptor 454, File Set Descriptor 472 records there. The logical block number which shows a certain position is described in Long Allocation Descriptor (drawing 20) form (in the example of drawing 17 and drawing 18, it has recorded on the 100th logical block from LAD (100)).

7) Access the 100th logical block (by a logical sector number, it becomes the 400th), and reproduce File Set Descriptor 472. Root Directory ICB in it. 473 the place (logical block number) where it is alike and File Entry about Root Directory A 425 is recorded describing in Long Allocation Descriptor (drawing 20) form, and. It is (in the example of drawing 17 and drawing 18, it has recorded on the 102nd logical block from LAD (102)).

[0288]According to LAD (102) of Root Directory ICB 473, 8) Access the 102nd logical block and reproduce File Entry 475 about Root Directory A 425, The position (logical

block number) on which the information about the contents of Root Directory A 425 is recorded is read (AD (103)).
9) Access the 103rd logical block and reproduce the information about the contents of Root Directory A 425.
[0289]File Data H 432 is Directory D 428. Since it exists under a series, File Identifier Descriptor about Directory D 428 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (110)) on which File Entry about Directory D 428 is recorded is read.
10) Access the 110th logical block, reproduce File Entry 480 about Directory D 428, and read the position (logical block number) on which the information about the contents of Directory D 428 is recorded (AD (111)).
11) Access the 111st logical block and reproduce the information about the contents of Directory D 428.
[0290]Since File Data H 432 exists in the bottom of SubDirectoryF 430 directly, File Identifier Descriptor about SubDirectory F 430 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (112)) on which File Entry about SubDirectoryF 430 is recorded is read.
12) Access the 112nd logical block and File Entry 482 about SubDirectoryF 430 is reproduced, The position (logical block number) on which the information about the contents of SubDirectory F 430 is recorded is read (AD (113)).
13) Access the 113rd logical block, reproduce the information about the contents of SubDirectory F 430, and look for File Identifier Descriptor about File Data H 432. And the logical block number (although not illustrated to drawing 17 and drawing 18 LAD (114)) on which File Entry about File Data H 432 is recorded is read in there.
14) Access the 114th logical block and read the position which reproduces File Entry484 about File Data H 432 and on which data content 489 of File Data H 432 is recorded.
15) Also consider the logical block number which carried out additional registration by 4 or 4', and record the data content 489 of File Data H 432 after change.
[0291][F] Explain how to eliminate File Data H 432 or SubDirectory F 430 as specific file data / example of the directory erasing processing method.
[0292]It goes the information on Boot Descriptor 447 in Volume Recognition Sequence 444 field to reproduce as a boot (Boot) field at the time of the Information Storage Division playback equipment starting or information-storage-medium wearing. In accordance with the descriptive content of Boot Descriptor 447, the processing at the time of boot (Boot) starts. When there is no processing at the time of the boot specified especially, the information on Logical Volume Descriptor 454 in Main Volume

Descriptor Sequence 449 field is reproduced first.
3) Logical Volume Contents Use 455 is described in Logical Volume Descriptor 454, File Set Descriptor 472 records there. The logical block number which shows a certain position is described in Long Allocation Descriptor (drawing 20) form (in the example of drawing 17 and drawing 18, it has recorded on the 100th logical block from LAD (100)).
4) Access the 100th logical block (by a logical sector number, it becomes the 400th), and reproduce File Set Descriptor 472. Root Directory ICB473 in it. The place (logical block number) where it is alike and File Entry about Root Directory A 425 is recorded describes in Long Allocation Descriptor (drawing 20) form. It is (in the example of drawing 17 and drawing 18, it has recorded on the 102nd logical block from LAD (102)).
[0293]According to LAD (102) of Root Directory ICB 473, 5) Access the 102nd logical block and reproduce File Entry 475 about Root Directory A 425, The position (logical block number) on which the information about the contents of Root Directory A 425 is recorded is read (AD (103)).
6) Access the 103rd logical block and reproduce the information about the contents of Root Directory A 425.
[0294]Since File Data H 432 exists under Directory D 428 series, File Identifier Descriptor about Directory D 428 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (110)) on which File Entry about Directory D 428 is recorded is read.
7) Access the 110th logical block, reproduce File Entry 480 about Directory D 428, and read the position (logical block number) on which the information about the contents of Directory D 428 is recorded (AD (111)).
8) Access the 111st logical block and reproduce the information about the contents of Directory D 428.
[0295]Since File Data H 432 exists in the bottom of SubDirectoryF 430 directly, File Identifier Descriptor about SubDirectory F 430 is looked for.
<<Case where SubDirectory F 430 is eliminated>> A "file deletion flag" is set to File Characteristics 422 (drawing 24) in FileIdentifier Descriptor about SubDirectoryF 430.
[0296]The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (112)) on which File Entry about SubDirectory F 430 is recorded is read.
9) Access the 112nd logical block, reproduce File Entry 482 about SubDirectory F 430, and read the position (logical block number) on which the information about the contents of SubDirectory F 430 is recorded (AD (113)).
10) Access the 113rd logical block, reproduce the information about the contents of SubDirectory F 430, and look for File Identifier Descriptor about File Data H 432.

<<Case where File Data H 432 is eliminated>> A "file deletion flag" is set to File Characteristics 422 (drawing 24) in File Identifier Descriptor about File Data H 432. Furthermore, the logical block number (although not illustrated to drawing 17 and drawing 18 LAD (114)) on which File Entry about File Data H432 is recorded is read in there.

11) Access the 114th logical block and read the position which reproduces File Entry484 about File Data H 432 and on which data content 489 of File Data H 432 is recorded.

<<Case where File Data H 432 is eliminated>> The logical block on which data content 489 of File Data H 432 was recorded by the following methods is released (the logical block is registered into a non-recorded state).

12) To the next Main Volume Descriptor Sequence 449 Partition Descriptor 450 in a field is reproduced and the information on Partition Contents Use 451 described in it is read. The recording position of SpaceTable or Space Bitmap is shown in this Partition Contents Use 451 (it is also called Partition Header Descriptor).

- The Space Table position is described by the column of Unallocated Space Table 452 in the form of Short AllocationDescriptor (the example of drawing 18 drawing 17, AD (50)).

-Space Bitmap position is described by the column of Unallocated Space Bitmap 453 in the form of Short Allocation Descriptor (the example of drawing 18 drawing 17, AD (0)).

13) Access to the logical block number (0) Space Bitmap read by 12 is described to be, and rewrite "the logical block number to release" which was acquired as for the result of 11 to SpaceBitmap Descriptor 470. Or it accesses to the logical block number (50) Space Table read by 13'12 is described to be, and "the logical block number to release" which was acquired as for the result of 11 is rewritten to Space Table.

* Actual processing performs "13", "13'", and one of processings.

<<Case where File Data H 432 is eliminated>> The position which steps on the same procedure as 1210 - 11 and on which the data content 490 of File Data I 433 is recorded is read.

13) To the next Main Volume Descriptor Sequence 449 Partition Descriptor 450 in a field is reproduced and the information on Partition Contents Use 451 described in it is read. The recording position of SpaceTable or Space Bitmap is shown in this Partition Contents Use 451 (it is also called Partition Header Descriptor).

- The Space Table position is described by the column of Unallocated Space Table 452 in the form of Short AllocationDescriptor (the example of drawing 18 drawing 17, AD (50)).

-Space Bitmap position is described by the column of Unallocated Space Bitmap 453 in the form of Short Allocation Descriptor (drawing 17 and the example of drawing 18 AD (0)).

14) Access to the logical block number (0) Space Bitmap read by 13 is described to be, and rewrite "the logical block number to release" which was acquired as for the result of 11 and 12 to Space BitmapDescriptor 470. Or it accesses to the logical block number (50) Space Table read by 14'13 is described to be, and "the logical block number to release" which was acquired as for the result of 11 and 12 is rewritten to Space Table.

* Actual processing performs "14", "14'", and one of processings.

[0297][G] Explain access and the adding processing method when newly adding file data or a directory under Sub DirectoryF 430 as an example of adding processing of file data/directory.

1) Calculate the number of logical blocks required in adding file data, in order to investigate the capacity of the contents of file data to add, to break the value by 2048Bytes and to add file data.

2) Go the information on Boot Descriptor 447 in Volume Recognition Sequence444 field to reproduce as a boot (Boot) field at the time of the Information Storage Division playback equipment starting or information-storage-medium wearing. In accordance with the descriptive content of Boot Descriptor 447, the processing at the time of boot (Boot) starts. When there is no processing at the time of the boot specified especially, it is at the beginning of three. Main Volume Descriptor Sequence 449 Partition Descriptor 450 in a field is reproduced, The information on Partition Contents Use 451 described in it is read. The recording position of Space Table or Space Bitmap is shown in this Partition Contents Use 451 (it is also called Partition Header Descriptor).

- The Space Table position is described by the column of Unallocated Space Table 452 in the form of Short Allocation Descriptor (the example of drawing 18 drawing 17, AD (50)).

-Space Bitmap position is described by the column of Unallocated Space Bitmap 453 in the form of Short Allocation Descriptor (drawing 17 and the example of drawing 18 AD (0)).

4) Access to the logical block number (0) Space Bitmap read by 3 is described to be. Space Bitmap information is read in Space Bitmap Descriptor 470, an unrecorded logical block is looked for and use of the logical block for the calculation result of 1 is registered (rewriting processing of Space Bitmap Descriptor 460 information). Or it accesses to the logical block number (50) Space Table read by 4'3 is described to be. an unrecorded logical block is looked for from USE (AD (*), AD (*), --, AD (*)) 471 of Space Table, and use of the logical block for the calculation result of 1 is registered.

[0298](Rewriting processing of Space Table information)

* Actual processing performs "4", "4'", and one of processings.

5) To the next Main Volume Descriptor Sequence 449 The information on Logical

Volume Descriptor454 in a field is reproduced.
6) Logical Volume Contents Use 455 is described in Logical Volume Descriptor 454, File Set Descriptor 472 records there. The logical block number which shows a certain position is described in Long Allocation Descriptor (drawing 20) form (in the example of drawing 17 and drawing 18, it has recorded on the 100th logical block from LAD (100)).
7) Access the 100th logical block (by a logical sector number, it becomes the 400th), and reproduce File Set Descriptor 472. Root Directory ICB in it. 473 the place (logical block number) where it is alike and File Entry about Root Directory A 425 is recorded describing in Long Allocation Descriptor (drawing 20) form, and. It is (in the example of drawing 17 and drawing 18, it has recorded on the 102nd logical block from LAD (102)).
[0299]According to LAD (102) of Root Directory ICB 473, 8) Access the 102nd logical block and reproduce File Entry 475 about Root Directory A 425, The position (logical block number) on which the information about the contents of Root Directory A 425 is recorded is read (AD (103)).
9) Access the 103rd logical block and reproduce the information about the contents of Root Directory A 425.
[0300] File Identifier Descriptor about Directory D 428 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (110)) on which File Entry about Directory D 428 is recorded is read.
10) Access the 110th logical block, reproduce File Entry 480 about Directory D 428, and read the position (logical block number) on which the information about the contents of Directory D 428 is recorded (AD (111)).
11) Access the 111st logical block and reproduce the information about the contents of Directory D 428.
[0301]File Identifier Descriptor about Sub DirectoryF 430 is looked for, The logical block number (although not illustrated to drawing 17 and drawing 18 LAD (112)) on which File Entry about Sub Directory F 430 is recorded is read.
12) Access the 112nd logical block and File Entry 482 about Sub Directory F 430 is reproduced, The position (logical block number) on which the information about the contents of Sub Directory F 430 is recorded is read (AD (113)).
13) Access the 113rd logical block and register File Identifier Descriptor of the newly added file data or a directory into the information about the contents of Sub Directory F 430.
14) Access the logical block number position registered in 4 or 4, and record File Entry about the file data or the directory newly added.
15) The logical block number position shown in Short Allocation Descriptor in File

Entry of 14 is accessed, The data content of the file data which Parent Directory about the directory to add File Identifier Descriptor or adds is recorded.

[0302]The contents of recorded information (data structure) of the information recorded on the information storage medium (OpticalDisk 1001) in which the rec/play of the video information and music information which are shown in drawing 26 (a) is possible are explained below.

[0303]As shown in drawing 26 (b) as a rough data structure of the information recorded on an information storage medium (Optical Disk 1001), sequentially from the inner circumference side (Inner Side 1006), · A light reflection surface uneven shape. The rewritable data zone (Rewritable data Zone) which can rewrite ene BOSUDO data zone (Embossed data Zone) carried out, mirror zone (Mirror Zone) with the flat (mirror plane) surface, and information. It is recorded on Rewritabledata Zone in which the record and rewriting by the read-in-area (Lead-in Area) 1002 user who had are possible, Audio and video data (Audio.) & The file of Video Data. Or in which the record and rewriting by BORIUMUANDO file management information (Volume & File Manager Information) 1003 and the user on whom the information about entire volume was recorded are possible. It is divided into the read out area (Lead-out Area) 1005 which comprises Rewritable data Zone which can rewrite data area (Data Area) 1004 and the information which consists of Rewritable data Zone.

[0304]In Embossed data Zone of Lead-in Area 1002. · Disk types, such as DVD-ROM/-RAM/-R, disk size, The information about the whole information storage medium, such as a physical sector number which shows storage density, and a recording start/recording end position, · The information about record, reproduction, and erasing qualities, such as record power, recording pulse width and erase power, reproduction power, and linear velocity at the time of record and elimination, · The information, including a serial number etc., concerning manufacture of the information storage medium per sheet respectively, It is recorded on ****** and, respectively to Rewritable data Zone of Lead-in Area 1002, and Rewritable data Zone of Lead-out Area 1005 The peculiar diskname record section for · each information storage medium of every, · It has a trial recording field (for the check of record deletion conditions), and a management information recording region about the defect region in -Data Area 1004, and record by Information Storage Division playback equipment is attained to the described area.

[0305]As shown in drawing 26 (c), mixture record of Computer Data and Audio & Video Data is attained Data Area 1004 inserted between Lead-in Area 1002 and Lead-out Area 1005. The recording order of Computer Data and Audio & Video Data and each

recorded information size are arbitrary, The computer data (Computer Data) the place currently recorded Computer Data Area 1008, 1010 Name Audio & Video Data Area 1009 the field where it called and Audio &Video Data was recorded.

[0306]The data structure of the information recorded in Audio & Video Data Area 1009 like drawing 26 (d), - the anchor pointer control information (Anchor Pointer for Control Information) for control information -- 1015 : Audio & Video Data Area 1009 -- it being arranged at the position of the inner beginning and, Audio & Video Data Area 1009 Information which shows the head position (start address) on which inner Control Information 1011 is recorded, - Control-in formation (Control Information) 1011: Recording (sound recording), Reproduction, edit, search Control information required when performing each processing, and - Video object (Video Objects) 1012 : Recording information of Video Data contents (Contents), - picture object (Picture Objects) 1013 : Still picture and Slide picture etc. -- still picture information. - Audio object (Audio Objects) 1014 : Recording information of Audio Data contents (Contents), - Thumbnail object (Thumbnail Objects) 1016 : When searching the place in Video Data to see, it comprises information, including the thumbnail (Thumbnail) etc. which are used at the time of edit, etc.

[0307] Video Objects 1012 of drawing 26 (d), and Picture Objects 1013, Audio Objects 1014 and Thumbnail Objects 1016 mean the meeting (group) of the information classified into every contents of contents (data contents), respectively. Therefore, all the video information recorded on Audio & VideoData Area 1009 is included in VideoObjects 1012, All the still picture information is included in Picture Objects 1013, All the audio sound information is included in Audio Objects 1014, and all the thumbnail information that it is used for management and search of video information is included in Thumbnail Objects 1016.

[0308] VOB(Video Object)1403 shown by drawing 27 is AVFile1401. The lump (settlement) of the information recorded inside is shown and it has become a different definition from VideoObjects 1012 of drawing 26 (d). Although the similar term is used, since it is used in a completely different meaning, cautions require.

[0309]Furthermore, the contents of Control Information 1011, - AV data control information (AV Data Control Information) 1101 : Video Objects 1012 An inner data structure is managed, It is certain Optical Disk 1001 with an information storage medium. Management information of the information about the upper recording position, - Playback control information (Playback Control Information)1021 : Control information required at the time of reproduction, - Control information and edit control information required at the time of recording control information KESHON (Recording

Control Information) 1022 record (recording and sound recording) : (Edit.) Control Information1023 : Control information required at the time of edit, - Thumbnail control information (Thumbnail Control Information)1024 : Management information about the object for place search or the thumbnail (ThumbnailObject) for edit in Video Data to see, It has ****.

[0310] AV Data Control Information 1101 shown in drawing 26 (e) an inner data structure, - Allocation map table (Allocation Map Table) 1105 : Address selection which met the actual arrangement on an information storage medium (Optical Disk 1001), The information about discernment of having existing recorded and sheep recording area, etc., - video title set information (Video Title Set Information)1106 : As shown in drawing 27, it is AV File 1401. Inner overall information content is shown, It is the grouping information of VOB for the relation information between each video object (VOB), and management and search two or more. The hour entry of the time map table (Time Map Table) etc., - Video object control information (Video Object ControlInformation) 1107 : As shown in drawing 27 (c), it is AV File 1401. Each inner VOB The information about each is shown, VOB -- each time -- attribute (characteristic) information and VOB -- information [ ] about VOBU of inner each. - Program chain control information (PGC Control Information) 1103 : Information about a video information reproduction program (sequence), - the information about the data structure of the video information basic unit at the time of cell playback information (Cell Playback Information)1108:reproduction -- it is ** constituted. If even (f) of drawing 26 is surveyed, it will become the above-mentioned contents, but some explanation supplement is performed to below to each information. The information about the number of files about the information about the whole - Volume, the number of files of PC data contained, and AV information, - record layer information, etc. is recorded on Volume &File Manager Information 1003. It is the number of - composition layers (example: one RAM/ROM two-layer disk 2 layers) especially as record layer information. . Two layers and n single-sided disks also count one ROM two-layer disk as an n layer. - The logical sector range-of-number table assigned for every layer (capacity for every layer), - the characteristic (example: -- the RAM part of a DVD-RAM disk and a RAM/ROM two-layer disk.) for every layer The allotment logical sector range-of-number table in the Zone unit in the RAM area for - each layers of every, such as CD-ROM and CD-R (the rewriting feasible region information capacity for every layer is also included), - Original ID information (-- in order to discover disk-swapping in multiple-string disc pack) ** for every layer is recorded, the logical sector number which continued also to the multiple-string disc pack or the RAM/ROM two-layer disk is

set up, and it can treat now as one big Volume space.
[0311]In Playback Control Information 1021.- The information about the reproduction sequence which unified PGC, the information which shows the false recording position which considered like VTR or DVC that an information storage medium was one tape in relation to - above (sequence which plays all the recorded Cell(s) continuously), - Information about two or more screen simultaneous reproduction with different video information, - search information (-- the table of the start time in Cell ID corresponding for every search category and its Cell is recorded, and) The information etc. which a user chooses a category and make possible direct access to applicable video information are recorded. - program timed recording information etc. are recorded on Recording Control Information 1022.
[0312]In Edit Control Information 1023. - every -- the inverted print information on a PGC unit (-- applicable time setting information and the contents of inverted print are indicated as EDL information). - File conversion information (-- the particular part in AV file is changed into the file which can perform inverted print on PCs, such as an AVI file, and the place which stores the file after conversion is specified) is recorded.
[0313].Management information (-- Audio & Video Data Area 1009.) concerning -Thumbnail Objects 1016 in Thumbnail Control Information 1024 The specification information on VOB or Cell related to the recording place of a thumbnail image and each thumbnail image in every sheet inside, VOB or Cell related to each thumbnail image -- inner place information etc. (if attached to VOB and Cell, the contents explanation place of drawing 27 explains in detail) etc. -- it is indicated.
[0314] Data Area1004 of drawing 26 (b) All the information recorded inside is recorded by a file basis, and the relation between each data file is managed by directory structure, as shown in drawing 28.
[0315]Under the root directory 1450, for every file content recorded, two or more subdirectories 1451 are installed so that easily [a classification]. Each data file about ComputerData recorded on Computer Data Area 1008 of drawing 26 (c) and 1010 in the embodiment of drawing 28 is an object for Computer Data preservation. It is recorded under the subdirectory 1457, Audio & Video Data recorded on Audio & Video Data Area 1009 It is recorded under rewritable video title set RWV_TS1452. When the video information currently recorded on the DVDVideo disk is copied to drawing 26 (a) It copies under video title set VIDEO_TS1455 and audio title set AUDIO_TS1456.
[0316] Control Information 1011 of drawing 26 (d) Information is recorded as one file as rec/play video control data. In the embodiment of drawing 28, the file name has named RWVIDEO_CONTROL.IFO. It has recorded on backup by the file name to which the

same information is said as RWVIDEO_CONTROL.BUP. This RWVIDEO_CONTROL.IFO and RWVIDEO_CONTROL.BUP 2 file is dealt with as a conventional file for computers.

[0317]In the embodiment of drawing 28, all the video information data belonging to Video Objects 1012 of drawing 26 (d) is collectively recorded on Video Objects File 1447 of the file name called RWVIDEO.VOB. That is, all the video information data belonging to Video Objects 1012 of drawing 26 (d) is combined with continuation within one VTS (Video Title Set 1402), as shown in drawing 27 (b), It is recorded succeeding the inside of one file called Video Objects File 1447. (That is, all are collectively recorded in one file, without dividing a file for every [PTT(Part_of_Title) 1407 and] 1408.) Picture Objects File 1448 of the file name which says all the still-picture-information data belonging to Picture Objects 1013 as RWPICTURE.POB It is collectively recorded inside. In Picture Objects 1013, two or more still picture information is included. Although the recording form recorded as a separate file for every still picture of one sheet is adopted in the digital camera, Unlike the recording form of a digital camera, in this invention embodiment, two or more still pictures of all contained in Picture Objects 1013 are continuously connected in the same form as drawing 27, Picture Objects File1448 [of the file name called RWPICTURE.POB] of one sheet The feature of this invention embodiment is in the place collectively recorded inside.

[0318]One Audio Objects File 1449 of the file name which similarly also says the whole tone voice information belonging to Audio Objects 1014 as RWAUDIO.AOB It is collectively recorded inside, Thumbnail Objects File 1458 of a name which also says all the thumbnail information belonging to Thumbnail Objects 1016 as RWTHUMBNAIL.TOB It is collectively recorded inside.

[0319] Video Objects File. All of 1447, Picture Objects File 1448, AudioObjects File 1449, and Thumbnail Objects File 1458 are dealt with as AV File 1401.

[0320]Although not illustrated to drawing 26, the rec/play additional information 1454 which can be used at the time of recording playback of an image is simultaneously recordable, the information is collectively recorded as one file, and the file name called RWADD.DAT is attached in the embodiment of drawing 28. LBN in AV file in this invention and the relation of AV Address are shown in drawing 29. On the information storage medium, it is dotted physically and the information on AV File 1401 is recorded, as shown in drawing 29 (a). Now and AV File 1401 Distributed record is carried out Extent#alpha 3166, Extent#gamma 3168, and Extent #delta 3169, The case where the entry sequence on File Entry is set as Extent #delta 3169, Extent #gamma 3168, and Extent#alpha 3166 is considered. AV Address which the rec/play application 1 manages

connects continuously Extent registered into File Entry completely regardless of the recording position on an information storage medium, And the entry sequence on File Entry sets small AV Address value as young order. AV Address will be managed by Extent. For example, the LBN value of the sector of the beginning of Extent #gamma 3168 is "c" as shown in drawing 29 (a), When the LBN value of the last sector is "d-1", AV Address value of the same sector is set to "f-e" and "(f-e)+(d-c)-1", respectively, as shown in drawing 29 (b).

[0321]Unlike the computer information of the former [video information], the guarantee of the continuity at the time of record serves as an indispensable condition. How to guarantee explanation of the Reason for checking the continuity at the time of this record and the continuity at the time of record to below is explained.

[0322]The recording system system concept figure for explaining the continuity at the time of record is shown in drawing 30. The video information sent from the outside is stored temporarily by buffer memory (semiconductor memory) BM219. If the optical head 202 reaches to the recording position on the information storage medium 201 by rough access 1334 and dense access 1333 operation, the video information stored temporarily by the above-mentioned buffer memory (semiconductor memory) BM219 will be recorded on the information storage medium 201 via the optical head 202. The transfer rate of the video information sent to the optical head 202 from buffer memory (semiconductor memory) BM219 is defined as the physical transfer rate (PTR:Physical Transmission Rate) 1387 here. The average value of the transfer rate of the video information transmitted to buffer memory (semiconductor memory) BM219 from the exterior is defined as the system transfer rate (STR:System Transmission Rate) 1388 here. It has a value different generally from the physical transfer rate PTR and system transfer rate STR.

[0323]The access operation which moves the condensing spot position of the optical head 202 for recording video information on a different place on the information storage medium 201 one by one is needed. To big movement, rough access 1334 to which the optical head 202 whole is moved is performed, and although not illustrated for movement of very small distance, dense access 1333 to which only the object lens for laser beam condensing is moved is performed.

[0324]Drawing 31 and drawing 32, The time shift of the amount of video information temporarily saved in buffer memory (semiconductor memory) BM219 in the case of recording video information on the prescribed position on the information storage medium 201 one by one is shown performing access control of the optical head 202 from the outside to the video information transmitted. Since the physical transfer rate PTR is

generally quicker than system transfer rate STR, in the period of the video information record time 1393, 1397, and 1398, the amount of video information temporarily saved in the buffer memory 219 continues decreasing. The amount of video information stored temporarily in the buffer memory 219 is set to "0." The video information then transmitted continuously is continuously recorded on the information storage medium 201 as it is, without being stored temporarily in the buffer memory 219, and the amount of video information temporarily saved in the buffer memory 219 changes with the state of "0."

[0325]Next, when recording video information on the different position on the information storage medium 201 after it, access processing of the optical head 202 is performed in advance of recording operation. As shown in drawing 32 as access periods of the optical head 202, the rough access time 1348 and 1376, the dense access time 1342 and 1343, and three kinds of time of the latency speed 1345 and 1346 of the information storage medium 201 are needed. Since recording processing to the information storage medium 201 is not performed during this period, physical transfer rate PTR1387 of this period is in the state of "0" substantially. Since average system transfer rate STR1388 of the video information sent to buffer memory (semiconductor memory) BM219 from the exterior against it is kept eternal, an increase of the conservative quantity 1341 is enhanced temporarily [video information] in buffer memory (semiconductor memory) BM219.

[0326]access of the optical head 202 is completed -- again -- the recording processing to the information storage medium 201 -- starting (period of the video information record time 1397 and 1398) -- the conservative quantity 1341 decreases again temporarily [video information] in buffer memory (semiconductor memory) BM219. This reduction slope, [Average system transfer rate STR1332] -[Physical transfer rate PTR1331] It is come out and decided.

[0327]Then, since it is accessible only with dense access when accessing again the near position of the recording position on an information storage medium, only the dense access time 1363, 1364, 1365, and 1366 and the latency speed 1367, 1368, 1369, and 1370 are needed.

[0328]Thus, it can be considered as the conditions which make continuous recording possible, and "the upper limit of the access frequency within a specific period" can prescribe. Although the above explained continuous recording, since it is similar to the contents which also mentioned above the conditions which make continuous reproduction possible, "the upper limit of the access frequency within a specific period" can prescribe.

[0329]The access frequency conditions which make continuous recording impossible absolutely are explained using drawing 31. When access frequency is the highest, the video information record time 1393 is dramatically short like drawing 31, and when only the dense access time 1363, 1364, 1365, and 1366 and the latency speed 1367, 1368, 1369, and 1370 continue continuously, it becomes. In this case, however early physical transfer rate PTR1387 may be, reservation of record continuity becomes impossible. If the capacity of the buffer memory 219 is expressed with BM now, the interim storage video information in the buffer memory 219 will become full in the period of BM/STR, and interim storage into the buffer memory (semiconductor memory) 219 will become impossible about the newly transmitted video information. It stops as a result, being able to carry out continuous recording of the video information of the part by which interim storage into the buffer memory (semiconductor memory) 219 was not made.
[0330]As shown in drawing 32, the video information record time and access time can be balanced, The continuity of the video information record which was seen globally, and was seen from the external system without the interim storage video information in the buffer memory 219 overflowing when the interim storage video information in the buffer memory 219 is kept almost constant is secured. Each rough access time SATi (Seek Access Time of an object lens), Set average rough access time after n times access to SATa, and the video information record time for every access DWTi (Data Write Time), The average video information record time which records video information on an information storage medium after access in every time for which it asked as average value after n times access is set to DWTa. Latency speed in every time is set to MWTi (Spindle Motor Wait Time), and the average of search time after n times access is set to MWTa.
[0331]The video information data volume transmitted to the buffer memory 219 from the exterior in all the access periods at the time of accessing n times is STR x (sigma (SATi+JATi+MWTi)) STR x n x (SATa+JATa+MWTa) (1).
It becomes. Amount (PTR-STR) of video information xsigmaDWTi x(PTR-STR) n-DWTa (2) which accessed n times with this value and was transmitted to the information storage medium 201 from the buffer memory 219 at the time of video information record It is x(PTR-STR) n-DWTa >= STRxnx (SATa+JATa+MWTa) (3), i.e. (PTR-STR), x DWTa >= STR x (SATa+JATa+MWTa), in between.
When it is in ******, the continuity at the time of the video information record seen from the external-system side is secured. It is Ta= SATa+JATa+MWTa when the average number of hours required for one access is set to Ta here. Since it is set to (4), (3) types are x (PTR-STR) DWTa >=STR x Ta (5).

It changes. In this invention, the big feature is in the place which adds restriction to the lower limit of the data size which carries out continuous recording after one access, and reduces average access frequency. The data area which carries out continuous recording on an information storage medium after one access is defined as "Contiguous Data Area." (5) A formula to DWTa >= STR x Ta / (PTR-STR) (6)
It can change.
[0332]The Contiguous Data Area size CDAS is CDAS = DWTa x PTR (7).
Since it can be come out and found, they are (6) types and (7) types to CDAS >= STR x PTR x Ta / (PTR-STR) (8).
It becomes. (8) The lower limit of Contiguous Data Area size for making continuous recording possible from a formula can be specified.
[0333]Time required for rough access and dense access changes greatly with performances of Information Storage Division playback equipment. It is SATa 200 ms temporarily now. (9) is assumed. As mentioned above, MWTa 18ms and JATa 5ms are used on calculation.
[0334]With DVD-RAM, it is TR = 11.08Mbps (10) 2.6 GB.
It comes out. The average transfer rate of MPEG 2 is STR 4Mbps (11).
If the above-mentioned numerical value is substituted for a ** case at (8) types, it is CDAS >= 1.4Mbits (12).
******. It is SATa+JATa+MWTa = 1.5 seconds as another estimate. (13)
When it carries out, it is (8) types to CDAS >= 9.4Mbits (14).
It becomes. On the standard of rec/play DVD, it is STR = 8Mbps (15) as a maximum transfer rate of MPEG 2.
Since it has specified that it becomes below, if the value of (15) types is assigned to (8) types, it is CDAS >= 43.2Mbits 5.4 MBytes (16).
******.
[0335]Comparison explanation of Linear Replacement as an alternative method to the defect region generated on the information storage medium using drawing 16 and Skipping Replacement was already given. Here, comparison of the LBN (Logical Block Number) setting method at the time of each alternating processing is explained preponderantly. As already explained, all the record sections on an information storage medium are divided into the sector in every 2048 bytes, and the sector number (PSN:Physical Sector Number) is beforehand given to all the sectors physically. This PSN is managed with Information Storage Division playback equipment (ODD:Optical Disk Drive) 3, as drawing 4 explained.
[0336]As shown in drawing 33 (beta), by the Linear Replacement method, the

setting-out place of the alternative field 3455 is restricted in Spare Area 724, and cannot be set as arbitrary places. When a defect region does not exist on an information storage medium in one place, LBN is assigned to all the sectors in User Area 723, and LBN is not set to the sector in Spare Area724. If the defect region 3451 of an ECC block unit occurs in User Area 723, setting out of LBN in this place will be removed (3461), and that LBN value will be set as each sector in the alternative field 3455.

[0337]In the example of drawing 33 (beta), the value of "a" is set up as "b" and LBN as PSN of the heading sector of the record section 3441, respectively. In a similar manner, as for PSN of the heading sector of the record section 3442, "b+32" is set up, and, as for LBN, "a+32" is set up. As shown in drawing 33 (alpha) as data which should be recorded on an information storage medium, when record data #1, record data #2, and record data #3 exist, record data #1 is recorded on the record section 3441, and record data #3 is recorded on the record section 3442. It is inserted into the record sections 3441 and 3442, and when the field where PSN of a heading sector starts in "b+16" is the defect region 3451, data is not recorded here and LBN is not set up, either. Instead, record data #2 is recorded on the alternative field 3455 to which PSN of the heading sector in Spare Area 724 starts in "d", and LBN which starts in a heading sector "a+16" is set up.

[0338]Since like and the address which FileSystem 2 manages which are shown in drawing 4 is LBN(s), the defect region 3451 was avoided by the Linear Replacement method and LBN is set up, It has been the feature of the Linear Replacement method not to make File System 2 conscious of the defect region 3451 on an information storage medium. Conversely, in the case of this method, by File System 2 side, there is also a fault referred to as being unable to take the correspondence about the defect region 3451 on an information storage medium at all.

[0339]As the Skipping Replacement method is shown in drawing 33 (gamma) to it, LBN is set up also to the defect region 3452, File System 2 side also has the big feature of this invention in the place which can take correspondence to the defect region generated on the information storage medium (it puts in in management scope) and which was made like.

[0340]In the example of drawing 33 (gamma), LBN of the heading sector of the defect region 3452 is set to "a+16." The next feature of this invention is in the place which enabled setting out of the alternative field 3456 to the defect region 3452 in the arbitrary positions in User Area723. As a result, the alternative field 3456 is arranged just behind the defect region 3452, and record data #2 which should be essentially recorded on the defect region 3452 can be immediately recorded in the alternative field 3456.

[0341]In the Linear Replacement method shown in drawing 33 (beta), in order to record record data #2, the optical head needed to be moved to Spare Area 724, and it had taken the access time of the optical head. To it, by the Skipping Replacement method, access of an optical head can be made unnecessary and record data #2 can be recorded just behind a defect region. As shown in drawing 33 (gamma), Spare Area724 is not used by the Skipping Replacement method, but it is treating as the non recording field 3459.
[0342]That is, the effect corresponding to the point of an embodiment and it which showed drawing 33 in which the big feature of this invention is shown is A]. LBN is set up also to the defect region 3452.
[0343]-- In the defective disposal method shown in the Linear Replacement method shown in drawing 33 (beta), or drawing 16, since LBN is not directly given to a defect region, a defect region exact from File System 2 is not known. It is possible to leave defect management to Information Storage Division playback equipment 3 thoroughly, as it is shown in drawing 33 (beta) or drawing 16, when the amount of defects generated on an information storage medium is little. When a lot of defects which exceed the size of Spare Area occur, and only Information Storage Division playback equipment 3 performs defect management, a breakdown will arise.
[0344]If LBN is set as the defect region 3452 to it and it enables it to recognize the place of the defect region 3452 also by File System 2 side, Information Storage Division playback equipment 3 and File System 2 can cooperate by a method as shown in step ST3-05 of a record procedure explained later - -07, and it can be in charge of defective processing, and even when a lot of defects occur on an information storage medium, record of video information can be continuously continued without a breakdown.
[0345]B]It generates in User Area 723 and the defect region 3452 which set up LBN is made to remain on LBN space as it is.
[0346]-- Also by the Linear Replacement method and the same Skipping Replacement method which were shown in drawing 33 (beta), like drawing 16 (c) as a LBN setting method. Spare Area 724 When LBN is set up inside (extension region 743 used for Information Storage Division), the recorded information is deleted, and when recording new information, a problem arises (although a problem does not arise at the time of initial record).
[0347]that is, In all LBN space tops, the continuous address is set up if it sees from File System 2 (that LBN set as Spare Area 746 has been arranged at the position which is physically separated from User Area 723.). File System 2 is that which is not known and FileSystem 2 tends to record information on the continuous range on LBN space. Once it sets up LBN in Spare Area 724, Information Storage Division playback equipment 3

must record information on an information storage medium according to specification of File System 2, It will be necessary to move to the LBN setting-out place on Spare Area 724 at the time of record, and to carry out Information Storage Division, the access frequency of an optical head may increase, conservative quantity may be saturated like drawing 31 temporarily [video information] in the semiconductor memory in Information Storage Division playback equipment, and, as a result, continuous recording may become impossible.

[0348]If LBN set up like drawing 33 (gamma) to it is always set up in User Area 723, when another information is recorded on the place after information deletion, unnecessary access of an optical head can be restricted, and the continuous recording of video information will become possible. C]The alternative field 3456 is set up just behind the defect region 3452 generated in User Area 723.

[0349]-- Compared with the Linear Replacement method it was indicated to drawing 33 (beta) that mentioned above, record data #2 is recordable just behind a defect region by the Skipping Replacement method of drawing 33 (gamma), As a result, unnecessary access of an optical head can be restricted, and the continuous recording of video information becomes possible. It is in the place to say.

[0350]Next, the data structure of the deficiency management information at the time of performing a Skipping Replacement approach is explained. As a record method of the deficiency management information in this case, in an embodiment of the invention. 1) How to notify to the File System 2 side after changing into LBN information within Information Storage Division playback equipment after it keeps records on an information storage medium as PSN information as shown in drawing 34, and Information Storage Division playback equipment 3 reads the information, 2) As shown in drawing 35, keep records on an information storage medium as LBN information, The method of the method (in this case, the processing which records deficiency management information on an information storage medium also corresponds by the File System side directly) of reproducing by the File System side directly and processing Information Storage Division playback equipment 3 without intervening is shown.

[0351]As shown in drawing 9 and drawing 10, the deficiency management information corresponding to the Linear Replacement method as PSN information. The DMA fields 663 and 691 are established in Rewritable data Zone 613 in Lean-in Area 1002 and Lean-out Area 1005 of drawing 34, and 645, It is already recorded as Secondary Defect List 3413. In this invention embodiment, the big feature is in the place which distinguished and recorded the deficiency management information (SDL3413) corresponding to PC data, and the deficiency management information (TDL3414)

corresponding to AV information (video information).
[0352]That is, in this invention, the deficiency management information corresponding to the Skipping Replacement method is defined as Tertiary Defect List 3414. TDL entry 3427 per piece and 3428 information are given to one substitute processing (for example, setting out of the alternative field 3456 to the defect region 3452 in drawing 33 (gamma)), respectively.
[0353]To the Linear Replacement method, it has registered as group information on the head position sector number 3432 in the alternative ECC block of said defective block which shows the heading sector 3431 and the alternative field place in the defective ECC block which is defect region place information. Since it is decided in the case of the Skipping Replacement method that the place of the alternative field 3456 will be immediately after the defect region 3452. It is considered as the heading sector number (PSN) 3433 in a defective ECC block, and the group information on the place 3434 which recorded "FFFFFFh" as Skipping Replacement identification information instead of alternative field place designation as information in TDL entry 3427 and 3428.
[0354]The deficiency management information which was able to take the unity of SDL entry 3422 corresponding to the Linear Replacement method and 3423 with this record method is recordable on an information storage medium. All the deficiency management information shown in drawing 34 is managed by the Information Storage Division playback equipment 3 side. All of TDL3414 information reproduced by the Information Storage Division playback equipment 3 side or SDL3413 information are recorded by PSN. As drawing 33 (beta) (gamma) shows, correspondence of the couple 1 between PSN and LBN is attached for every defective disposal method. After performing "PSN->LSN conversion" using the relation specifically shown in drawing 11 and performing "LSN->LBN conversion" using the relation of drawing 20 and drawing 21, it notifies to File System 2 side by making the above-mentioned deficiency management information into LBN information.
[0355]To Information Storage Division playback equipment managing the deficiency management information shown by drawing 34, the deficiency management information shown in drawing 35 is managed by File System 2 side, and is recorded on the information storage medium (Optical Disk 1001) by LBN information form.
[0356]This information is Volume & File Manager Information 1003. It is recorded in Main Volume Descriptor Sequence 449 which inner UDF manages. Defect information is generically called Sparing Table 469, The deficiency management information corresponding to Linear Replacement to Secondary Defect Map 3471. The deficiency management information corresponding to Skipping Replacement is recorded on

Tertiary Defect Map 3472. Both have SD Map entry 3482, 3483 and TD Map entry 3487, and 3488 for each substitute processing of every. The information descriptive contents in each Map entry are the same contents as drawing 34 (g).

[0357]The heading sector number 3493 in the defective ECC block in TDM3472 specifies the defect region 3452 (ECC block = it manages per 16 sectors) of drawing 36 (gamma), Since the alternative field 3456 for recording the video information over the place is certainly immediately after the defect region 3452, 3494 is recorded as shown in drawing 35 (g).

[0358]As shown in drawing 37 as other embodiments in this invention of the management information managed by File System 2 side, 1 invisible file is created, Long Allocation Descriptor (drawing 23 explains) is adopted as 2 AV File which describes defect map information there, and there is a method of setting a defective flag as Implementation Use 412.

[0359]As it explained [above-mentioned], at the time of AV information record, can set the alternative field 3456 additionally arbitrarily, but. The alternative field at the time of defective generating to PC information was determined as beforehand in Spare Area724 shown in drawing 33 (beta), and alternating processing was impossible after using up Spare Area 724. When Spare Area 724 which defects occurred frequently on the information storage medium in order to solve the problem, and was shown in drawing 33 (beta) fills, the object for alternative partitioning of the addition of a defect region performed at the time of PC file record -- an embodiment of the invention -- as shown in drawing 36 (beta), the alternative dedicated file 3501 can be set up in User Area 723.

[0360]As drawing 30 - drawing 32 explained, in order to secure the continuous recording of video information, record in a Contiguous Data Area unit and fractional elimination processing are needed. When additional recording of a little video information 3513 which should be carried out additional recording is carried out to the video information 3511 already recorded like drawing 38 (a), At this invention, it is Contiguous Data Area #3 like drawing 38 (b). 3507 is secured and the remaining portion is managed as the free space 3515. In carrying out additional recording of a little video information 3514 which should be carried out additional recording, it records from the head position of this free space 3515.

[0361] Information Length3517 information is used as a controlling method of the head position of this free space 3516. The Information Length information 3517 is recorded in File Entry 3520, as shown in drawing 39. This Information Length 3517 means the information size actually recorded from AV file head as shown in drawing 38 (c).

[0362]At the time of the fractional elimination in AV file, like drawing 40, The fractional elimination place which has started CDA#beta and CDA#delta in the File System 2 side if AV Address and data size of a head position of Video Object #B 3532 which should be eliminated from the rec/play application 1 side are specified. It is registered into File Entry in AV file as intact Extent 3548 and 3549. The identification information of intact Extent 3548 and 3549, Allocation Descriptors 420 in File Entry 3520 of video information (AV file) is made into Long Allocation Descriptor like drawing 39 (f) shown in drawing 23 or this Description, The "intact Extent flag" is set up in Implementation Use 3528 and 412. When a DVD-RAM disk is used as an information storage medium, as shown in drawing 13, record by 502 units of ECC blocks and partial deletion are needed. Therefore, ECC block boundary position management is needed. In this case, when the boundary position of an erasure designation field and ECC block boundary position management shift, intact Extent 3548 and 3549 are set as a fraction part like drawing 40 (b), and an "intact Extent flag" is attached like drawing 39 (f).

[0363] Extent setting method after the video information record in this invention is explained using drawing 41. Deficiency management information is recorded on an information storage medium to the defect region on the information storage medium discovered at the time of video information record. In working example of this invention, since defect management is performed on File System 2, deficiency management information is recorded on TDL (TDL3414 of drawing 34 (e)) which Information Storage Division playback equipment 3 manages, the defect region 3566 is avoided, and Extent is set up (drawing 41).

[0364]Other working example in this invention to drawing 41 is shown in drawing 42. The controlling method of the defect region 3566 in drawing 42 is drawing 37. The method of the round mark 2 is used. Namely, Extent #1 which records and has video information also to the defect region 3566 as shown in drawing 42 3571 and Extent #2 3572 and Extent #3 Distinguish in 3573 and defective Extent 3595 is set up, It registers with File Entry of an AV file together.

[0365] Extent describing method in this case uses Long Allocation Descriptor described and shown in drawing 23, To this defective Extent3595, a "defective Extent flag" is set up in Implementation Use 3528 shown in drawing 39 (f), and the value of that flag has become "1."

[0366]As shown in drawing 41 and drawing 43, the case where avoided the defect region 3566 and Extent is set up is considered. After AV information is recorded in drawing 41 and the form of drawing 43 (e) now, another PC file is recorded on the LBN place corresponding to the defect region 3566 after the completion of 1. AV information record

(in this case, Linear Replacement processing is performed).
2. In order to delete AV file recorded further before, Contiguous Data Area #B of drawing 41 and drawing 43 (a) is deleted.
3. The processing referred to as recording another AV information on the place of Contiguous Data Area #B eliminated now may occur. In this case, on LBN space, PC file is already recorded on the LBN place corresponding to the defect region 3566.
[0367]In LBN/XXX in working example of this invention, the big feature is in the place which straddles existing PC file3582 and can set up Contiguous DataArea 3593 as shown in drawing 1. A concrete setting method is described in detail at the explanation place of below-mentioned drawing 48.
[0368]At this invention, it is a] as setups of above-mentioned Contiguous Data Area 3593. Existing PC file 3582 which may exist in Contiguous Data Area3593, or total Npc of the defect region 3586 which carried out LinearReplacement processing before should satisfy (28) types.
b]Total defect size Lskip which needs Skipping Replacement in Contiguous Data Area including the defect region 3586 which carried out Skipping Replacement processing before should satisfy (29) types.
c]Avoid existing PC file 3582 which may exist in Contiguous Data Area 3593, or the defect region 3586 which carried out Linear Replacement processing before, and to the next record section in Contiguous Data Area. When an optical head accesses, make rough access time 1348 and 1376 unnecessary.
[0369]-- It has set to existing PC file3582 or defect region 3586 size which carried out Linear Replacement processing before being small to such an extent that there is no rough access at the time of access of an optical head in necessity.
[0370]When AV information is recorded in Contiguous Data Area 3593, 1) Time to avoid existing PC file 3582 which may exist in Contiguous Data Area3593, and the defect region 3586 which carried out Linear Replacement processing before, and for an optical head access to the next record section, 2) AV information is not recorded at all the period which performs Skipping processing to the defect region 3587 which carried out Skipping Replacement processing last time at the time of record, and the first defect region to discover this time at the time of record, and on **********. Therefore, within this period, an increase of the amount of video information interim storage in the semiconductor memory in Information Storage Division playback equipment is enhanced completely like the rough access time 1348 of drawing 32, the dense access time 1343, and the period of the latency speed 1346. Therefore, this period can be treated in the period and the same rank of the rough access time 1348 of drawing 32,

the dense access time 1343, and the latency speed 1346. The total size of the defect region for which it is discovered for the first time at the time of the defect region 3587 which carried out Skipping Replacement processing last time within Contiguous Data Area 3593 at the time of record, and this record, and Skipping processing is needed is defined as Lskip.

[0371]Total time Tskip which passes through a Lskip part is Tskip = Lskip / PTR (21). It becomes. When this condition is considered, (8) types are CDAS>=STRxPTRx(Ta+Tskip)/(PTR-STR) (22).

It changes.

[0372]Avoid existing PC file 3582 which may exist in Contiguous Data Area3593, and the defect region 3586 which carried out Linear Replacement processing before, and to the next record section. When an optical head accesses, access by a track jump is performed, but the rough access time 1348 and 1376 makes small defect region 3586 size which carried out Linear Replacement processing even of the unnecessary level existing PCfile 3582 size and before at this time. With a common DVD-RAM drive, the object lens migration length at the time of dense access is **200 micrometers. It is a grade and is track pitch Pt = 0.74micrometer (23) of a DVD-RAM disk.

Minimum data size Dt = 17x2kBytes = 34kBytes (24) per one track

** existing PC file 3582 and defect region 3586 which carried out Linear Replacement processing before The size per piece is 200/0.74x34 = 9190kBytes (25).

There are the following necessities. If the margin of many places is foreseen and considered, the actual allowable maximum size is (25) types. One fourth of 2300 or less kBytes is desirable. When the above-mentioned conditions are satisfied, access to the next record section in Contiguous Data Area, . What is necessary is to take only the dense access time 1343 and the latency speed 1346 into consideration. Dense access time 1343 required for one access is set to JATa, Latency speed 1346 is set to MWTa, Contiguous Data Area If the total number of the defect region 3586 which carried out Linear Replacement processing inner existing PC file 3582 and before is set to Npc. Sum total access time Tpc required in order to avoid a described area is Tpc = Npc x (JATa+MWTa) (26).

It becomes. When this time is also taken into consideration, (22) types are CDAS >=STRxPTRx(Ta+Tskip+Tpc)/(PTR-STR) (27).

It changes.

(10) Each value of (13) and (15). When it uses (Tskip+Tpc), /Ta=20%. When it carries out, is considered as CDAS>=6.5MBytes(Tskip+Tpc)/Ta=10% and is considered as CDAS>=5.9MBytes (Tskip+Tpc) / Ta= 5%, CDAS>=5.7MBytes(Tskip+Tpc) /Ta=. It is set

to CDAS>=5.5MBytes, when it is considered as 3% and considered as CDAS>=5.6MBytes (Tskip+Tpc) / Ta= 1%. (27) Npc [from a formula and (26) types] <= {[CDASx(PTR-STR)/(STRxPTR)]-Ta-Tskip}
/(JATa+MWTa) (28)
(27) A formula and (21) types to Lskip <={[CDASx(PTR-STR)/(STRxPTR)]-Ta-Tpc} x PTR (29) can be drawn. Each value of (28), (10), (13), and (15) type, and MWTa 18ms, When JATa5ms is used (Tskip+Tpc), /Ta=10%, When referred to as Tskip=0, Npc<=6 (Tskip+Tpc) / Ta= 5%, It is set to Npc<=0, when are referred to as Tskip=0, it is referred to as Npc<=3 (Tskip+Tpc) / Ta= 3% and Tskip=0 and it is referred to as Npc<=1 (Tskip+Tpc) / Ta= 1% and Tskip=0. When each value of (29), (10), (13), and (15) type is used (Tskip+Tskip), /Ta=10%, When referred to as Tpc=0, Lskip<=208kBytes (Tskip+Tskip) / Ta= 5%, When referred to as Tpc=0, Lskip<=104kBytes (Tskip+Tskip) / Ta = 3%, It is set to Lskip<=0kBytes, when are referred to as Tpc=0 and it is referred to as Lskip<=62kBytes (Tskip+Tskip) / Ta= 1% and Tpc=0.
[0373]The above-mentioned explanation explained using drawing 30 as a recording system system concept figure of AV information.
[0374]When examining an underlying concept, it is satisfactory at drawing 30, but in order to inquire in details more, the system concept model of the recording system shown in drawing 44 is used.
[0375]When recording by PC system shown in drawing 7, the AV information inputted from the outside is changed into a digital compression signal via the MPEG gaude 134, is temporarily recorded on the main memory 112, and is transmitted to the Information Storage Division playback equipment 140 side of drawing 7 according to control of main CPU111. It has the buffer memory 219 also in Information Storage Division playback equipment 140, and the transmitted digital AV information is temporarily saved in the buffer memory 219.
[0376]The flow of concrete information is explained using drawing 45. The video information 3301 saved in the main memory 112 by the side of PC shown in drawing 44 is transmitted to the Information Storage Division playback equipment 140 side with the WRITE command by the conventional method. LBN which shows the starting position which records WRITE command in this conventional method, and the data size transmitted are specified. After this transmitted video information is stored temporarily by the free space 3311 in the memory 219 of Information Storage Division playback equipment which has not been transmitted yet, it is recorded on the recording place 3327 by the first time WRITE Command on an information storage medium like drawing 45 (B). Video information is stored temporarily by the following WRITE

command by video information 3315 field recorded on the information storage medium in the memory 219 of Information Storage Division playback equipment, and the recording work to the non-record section 3324 on an information storage medium begins. The result which carried out Skipping Replacement processing when the defect region 3330 occurred on the way like drawing 45 (c), A part of video information 3315 which was planning record has not entered in the prescribed range (the range of the non-record section 3324) on an information storage medium, the overflow information 3321 occurs and Information Storage Division playback equipment interrupts recording processing.

[0377]Thus, if Skipping Replacement processing explained by this invention is performed, recording processing will be interrupted by the conventional WRITE command which gives only LBN showing a recording start position, and transmission information size.

[0378]The method of this invention which can record AV information continuously for a long period of time is explained below, without being interrupted on the way, also when a lot of defects occur on an information storage medium.

[0379]The big feature about the AV information record method in this invention is * as shown in drawing 46. Step which judges whether the file which should be recorded is an AV file (ST01)

* The step which sets up the video information recording place on an information storage medium a priori (ST02)

* The step which records AV information on an information storage medium (ST03)

* Be in the place which has a step (ST04) which records the information arrangement information actually recorded on the information storage medium on the management domain on an information storage medium. This processing controls by FileSystem 2 side mainly taking the lead.

[0380]Drawing 47 shows the contents of step ST01 of drawing 46 in more detail, drawing 48 shows the contents of step ST02 of drawing 46 in more detail, and drawing 49 shows the contents of step ST03 of drawing 46 in more detail. Drawing 50 shows the contents of step ST04 of drawing 46 in more detail.

[0381]All processings to an information storage medium, such as Information Storage Division, information reproduction, and partial deletion of the information in AV file, are started for the first time, after the rec/play application 1 of drawing 6 points to the outline of processing to File System 2 within OS. The contents of an outline of the processing shown to File System 2 are notified by publishing SDK API Command 4 from the rec/play application 1 side. if SDK API Command 4 is received, the contents of the

directions will be concretely explained in easy words by File System 2 side -- DDK Interface Command 5 is published to Information Storage Division playback equipment 3, and concrete processing is performed.

[0382]The API command (SDK API Command 4) required since the processing shown in above-mentioned drawing 46 in this invention embodiment LBN/UDF and LBN/XXX is attained was shown in drawing 51.

[0383]The partial contents additional portion and new command portion in the command type 3405 of drawing 51 are the range of this invention. It is as follows when a series of disposal methods which the rec/play application 1 side performs using the API command are explained.

<AV information recording processing [ ]> 1st STEP: Create File Command notifies the attribute (are they AV file or PC file?) of a recording start and an object file to the OS side.

2nd STEP: By Set Unrecorded AreaCommend. Anticipation maximum size specification 3rd STEP of the AV information recorded on an information storage medium: Write File Command (a multiple-times command is published to OS) notifies AV information transmission processing to the OS/File System side.

4th STEP: When AV information size to record on later is known after a series of AV information recording processings are completed, it is also possible by publishing Set Unrecorded Area Command to secure a priori the area which records AV information next time, and to place it.

[0384]In the information storage medium of this invention, both AV information and PC information are recordable on the same information storage medium. Therefore, before recording next AV information, PC information is recorded on free space, and the case where free space is lost at the time of next AV information record arises.

[0385]In order to prevent it, a free space of big size is set up in AV file, advance reservation of a next AV information recording place is carried out, and it can set. (These 4th STEP may not perform.)

5th STEP: By Close Handle Command. Except adding an AV file attribute flag to * Create File Command which notifies a series of ends of recording processing to the OS/File System side, WriteFile Command, Close Handle Command makes the command for the conventional PC information record serve a double purpose as it is. A program change accompanying the video information record method change by the upper levels near the API interface within OS hierarchized by plurality inside by setting up such is made unnecessary, and existing OS software is made usable as it is in the upper levels. In the File System side belonging to lower layer OS portion near

Information Storage Division playback equipment, by the method shown in drawing 47, the target file judges AV file or PC file by the File System side independent, and is sorting out the use command over Information Storage Division playback equipment.
[0386]* Set up all addressing of a recording place by AV Address.
<AV/PC information reproduction processing [ ]> 1st STEP: By Create File Command. 2nd STEP which notifies a reproduction start to the OS side: By Read File Command (a multiple-times command is published to OS). It is directions 3rd STEP about a series of regeneration. : * which notifies a series of ends of regeneration to the OS/File System side by Close Handle Command As for regeneration, AV file and PC file perform common processing.
[0387]* Set up all addressing of a reproduction place by AV Address.
<Partial deletion [ ] in AV file> 1st STEP: Create File Command notifies the file name for partial deletion to the OS side.
2nd STEP: The deletion in a designated range is directed by Delete Part Of File Command.
[0388]-- In Delete Part Of File Command, AV Address which carries out a deletion start, and the data size to delete are specified with a parameter.
3rd STEP: Close Handle Command notifies a series of ends of regeneration to the OS/File System side.
By 1 stSTEP:Get AV Free Space Size Command <which asks the size of the non-record section which can record AV information on an information storage medium>. The reply of non-record section size can be got from the OS side only by asking the size of the non-record section which can record AV information, and publishing * Get AV Free Space Size Command to the OS side.
<Defragmentation (Defragmentation) processing [ ]> 1st STEP: The defragmentation processing for AV file is directed to the OS side by AV Defragmentation Command.
[0389]* Defragmentation processing for AV file can be performed by an AV Defragmentation Command independent.
[0390]* File information with small Extent size with which it is dotted on an information storage medium as a concrete disposal method for AV Defragmentation Command is moved for every Extent, Processing which extends the Contiguous Data Area secured space in a non-record section is performed.
[0391]After crunching above SDK API Command 4 concretely, the list of DDK Interface Command 5 which File System2 publishes to the Information Storage Division playback equipment 3 side is shown in drawing 52. the command newly shown by this invention except READ Command -- or it is the command which added correction in part to the

existing command.

[0392]Information Storage Division playback equipment is connected to IEEE1394 etc., and Information Transfer Sub-Division processing for two or more sets of apparatus is performed simultaneously. With the explanatory view of drawing 6 or drawing 7, Information Storage Division playback equipment 3 and 140 is connected only to one main CPU111. On the other hand, it is connected with main CPU for every apparatus when connected to IEEE1394 etc. Therefore, Slot_ID which is the identification information for every apparatus as another information is not transmitted to other apparatus by mistake is used. This Slot_ID is published by the Information Storage Division playback equipment 3 and 140 side. GET FREE SLOT_ID Command is what is published by File System 2 side, A start and end of AV information are declared with AV WRITE beginning flag and AVWRITE ending flag as a parameter, and directions of Slot_ID issue are issued to Information Storage Division playback equipment at the time of AV information start declaration.

[0393]The recording start position in AV WRITE Command is automatically set up as a current position (the following AV information is recorded from the LBN position which carried out the end of record by the last AV WRITE Command). AV WRITE number is set to each AV WRITE Command, As opposed to AV WRITE Command published [which was recorded in the buffer memory 219 of Information Storage Division playback equipment as command cash]. DISCARD PRECEDING COMMAND Command can perform issue cancellation processing using this AV WRITE number.

[0394] GETWRITE STATUS Command exists so that proper processing can be performed in File System 2 side before conservative quantity is saturated temporarily [AV information] in the buffer memory 219 of Information Storage Division playback equipment, as shown in drawing 31. The situation in the buffer memory 219 can grasp by File System 2 side by replying to the margin quantity in the buffer memory 219 as the return value 3344 of this GET WRITE STATUS Command. Whenever it publishes AV information for one Contiguous Data Area record at the time of defect-free by AV WRITE Command in this invention embodiment, this GET WRITE STATUSCommand is inserted, The subject-of-search size and the investigation start LBN which are the command parameters 3343 in GET WRITE STATUS Command are doubled with target Contiguous Data Area. Since the defect region discovered in the object range is given by GET WRITE STATUS Command by the return value 3344 as a value of each ECC block head LBN, this information is used for Extent setting out (ST4-04 of drawing 50) after AV information record.

[0395]By the command which carries out advance notice to Information Storage

Division playback equipment by making all the record schedule places into LBN information before AV information record, SEND PRESET EXTENT ALLOCATION MAP Command. It has Extent number, each Extent head position (LBN), and Extent size of a record schedule place in a command parameter. The record schedule place on this information storage medium is set up based on Zone boundary position information which is the return value 3344 of GET PERFORMANCE Command preceded and published, and the DMA information after LBN conversion.

[0396]The detailed disposal method in each step shown in drawing 46 is explained further below. The AV file identification flag 3362 is set up in Flags field in ICB Tag 3361 which is in ICB Tag 418 of FileEntry 3520 as the identification information of an AV file is shown in drawing 23 or drawing 53 (f), That discernment which is AV file can be performed by setting this flag as "1."

[0397]It is also possible to set up the AV file identification flag 3364 in File Identifier Descriptor 3364, as shown in drawing 24 or drawing 54 (d) as other embodiments of this invention.

[0398]The concrete flow chart of the step which identifies whether it is AV file shown in ST01 of drawing 46 is shown in drawing 47. Processing is started only after Create File Command is published from the rec/play application 1 side. The identifying method of an AV file changes with conditions, and is identified using the AV file attribute flag in Create FileCommand at the time of * new AV file creation, * Identify AV file using the attribute flag of the file already recorded on the information storage medium as it was shown in drawing 53 or drawing 54, when AV information was added to AV file which already exists.

[0399]-- There is an effect which serves as [attribute / (are they AV file or PC file?) / of each file by the side of the application program 1] needlessness (it judges automatically by File System 2 side, and the recording processing method is changed) in management by using this gentleman method. Conventional WRITE Command when an applicable file is a PC file in adopting such a method, Linear Replacement processing is performed and, in the case of an AV file, AV WRITE Command and Skipping Replacement processing are performed.

[0400]In the rec/play application 1 side, the anticipation maximum of AV information record scheduled size is set up after Create File Command issue, and Set Unrecorded Area Command is published. Contiguous Data Area is set up according to the maximum information size of the specification information, the defect distribution acquired by GETPERFORMANCE Command, and the schedule which should be recorded based on Zone boundary position information. When the embodiment of LBN/XXX is used, (27)

types and (28) types are used as these setups.
[0401] Allocation Descriptors information in File Entry of AV file which corresponds to the result with a basis is recorded a priori (ST2-07). Other information can be prevented from being recorded on a record predetermined position, when connecting with a, for example, IEEE1394 etc., by passing through this step and performing record of a between [two or more apparatus] in concurrency.
b) Even when record is interrupted by interruption to service etc. in continuous recording in AV information, the information on just before discontinuation can be saved by tracing a record predetermined position in order after a reboot. Which merit (EFFECT OF THE INVENTION) is obtained. Record predetermined position information is notified to the Information Storage Division playback equipment side by SEND PRESET EXTENT ALLOCATION MAP Command after that (ST2-08). Since Information Storage Division playback equipment knows the recording position and the order of record on an information storage medium a priori by this notification of audit, It becomes possible to make continuous recording continue, without stopping recording processing, even if SkippingReplacement processings occur frequently by the defect on an information storage medium at the time of AV information record.
[0402]The detailed content in the AV information continuous recording step shown in step ST03 of drawing 46 is explained using drawing 49.
[0403]As shown in drawing 38, the recording start position in AV file is checked a priori using Information Length 3517 information (ST03-01). When Write File Command is published from the rec/play application 1 (ST3-02), GET FREE SLOT_ID Command to which the AV WRITE beginning flag was set is published, and Information Storage Division playback equipment 3 is made to publish SLOT_ID (ST3-03).
[0404]The continuous recording disposal method after ST3-04 was typically shown in drawing 55. Video information #1 saved by AV WRITECommand at main memory, #2, and #3 are periodically transmitted in the buffer memory 219 in Information Storage Division playback equipment. The video information stored in the buffer memory 219 of Information Storage Division playback equipment is recorded on an information storage medium via the optical head 202. If the defect region 3351 occurs on the information storage medium 201, Skipping Replacement processing will be carried out, but since video information is not recorded on the information storage medium 201 in the meantime, the amount of video information stored temporarily in the buffer memory 219 in Information Storage Division playback equipment increases. File System 2 side publishes GET WRITE STATUS Command periodically, and is monitoring the amount of interim storage video information in the buffer memory 219. When this amount of

interim storage video information is likely to be saturated, by the File System side. 1) Publish DISCARD PRECEDING COMMAND Command, . Restrict the amount of video information which cancels a part of command cash in Information Storage Division playback equipment and which is transmitted to the Information Storage Division playback equipment side by AV WRITE Command of the 2 next (it reduces). 3) Process ******** for which it waits until it delays the issue time to following AV WRITE Command published to the Information Storage Division playback equipment side and the interim storage video information in the buffer memory 219 in Information Storage Division playback equipment decreases.

[0405]As the above-mentioned contents are shown in drawing 56 thru/or drawing 63, it explains using a concrete example. The three-stage shows transition of recorded information to drawing 63 from drawing 56, respectively. The Information Storage Division playback equipment memory and the 3rd step of the 1st step are the recording positions on an information recording medium the PC side memory and the 2nd step.

[0406]Corresponding to ST2-08 of drawing 48, SEND PRESET EXTENT ALLOCATION MAP Command of the round mark 1 in drawing 56 (A) is published. Since Extent head position information and Extent size information are set as a command parameter by this command as shown in drawing 52. "a", "d", and "g" which are the head positions LBN of Extent = CDA in the example of drawing 56 (A) -- Extent = CDA "c-a" and "f-d" which are size -- It is attached. AV WRITE Command of the round mark 2 and the round mark 3 is published so that video information may be recorded in 2 steps to CDA#1. Next, in order to grasp the recording situation in CDA#1, GET WRITE STATUS Command of the round mark 4 is published.

[0407]In order to specify the subject of search in GET WRITE STATUS Command as CDA#1, "a" is set up as the start LBN of the subject-of-search range which is a preset value of a parameter, and the value of "c-a" is set up as a subject-of-search range. In order to record video information in 2 steps to CDA#2 similarly, AV WRITE Command of the round marks 5 and 6 is published. And next, GET WRITE STATUS Command of the round mark 7 is published for the recording situation grasp to CDA#2.

[0408]This command is sent to the Information Storage Division playback equipment side at once, and command cash is carried out (ST3-05 of drawing 49). When the unused state place 3371 on the information storage medium shown by drawing 57 (B) does not have a defect, as it is shown in drawing 58 (C), the recorded information alpha 3361 on an information-storage-medium top is recorded. Next, if the defect region 3375 occurs as shown in drawing 59 (D), Skipping Replacement processing will be performed and a part of video information which is due to be recorded in CDA#1 will overflow, but. The

information overflowing since the place recorded on the next by the Information Storage Division playback equipment 3 side by SEND PRESET EXTENT ALLOCATION MAP Command a priori was found is recorded on the place of 3371 which is the shift information beta 3. The information about the above-mentioned defect region 3375 is notified to File System 2 side as the return value 3344 of GET WRITE STATUS Command of the round mark 4 (refer to ST3-05 of drawing 49, drawing 56, and drawing 60). It is judged whether the buffer memory 219 in Information Storage Division playback equipment (ODD) 3 overflows and meets within File System 2 (drawing 49 ST3-06). . And it is a record command about the video information which should be recorded on CDA#3 by DELETE PROCEDING COMMAND Command shown in the round mark 9 of drawing 60 (E) as the concrete method shown in ST3-07 of drawing 49. AV WRITE Command (drawing 56) of the round mark 8 It cancels and the command which restricted the amount of video information which should be transmitted by AV WRITE Command (drawing 60) of the round mark 10 (loss in quantity) is published.

[0409]Since the feedback to CDA#2 does not meet the deadline, as it is shown in drawing 61 (F), recording processing to an information-storage-medium top as planned [original] is performed.

[0410]As shown in drawing 62 (G), the recording start position in AV WRITE Command used here is not a current position, and the case where a recording start position is specified by File System 2 side is assumed. Even in this case, it permits that the recording start position specified by the File System 2 side by the defect region discovered at the time of the video information record to precede and the recording start position actually recorded shift substantially.

[0411] Close Handle Command published from the rec/play application 1 after a series of recording processings are completed is made into a trigger. GET FREE SLOT_ID Command to which the AV WRITE ending flag was added is published from 2 to the File System playback equipment [Information Storage Division] 3 side. In Information Storage Division playback equipment 3, if this command is received, it will not illustrate, but the defect information discovered at the time of this recording processing of a series of is added to TDL3414 of drawing 34 (e).

[0412]As post-processing to video information record The free-space size which it leaves in AV file based on Set Unrecorded Area Command information (ST4-03 of drawing 50) specified from the rec/play application 1 side is determined, Rewriting processing of the setup information about the rewriting processing (ST4-05) of Information Length 3517, the rewriting processing (ST4-04) of final Extent information, and UDF is performed.

[0413]The reproduction procedure of the video information in AV file is explained using

drawing 64. As shown in drawing 6, in the * rec/play application 1, AV Address is used as address information to manage, and SDK API Command 4 published to File System 2 carries out address selection using AV Address.
* In File System 2, use LBN (depending on the case, it is LSN) as address information to manage, and DDK Interface Command 5 published to Information Storage Division playback equipment 3 carries out address selection using LBN.
* Perform address administration using PSN in Information Storage Division playback equipment 3.
[0414]It is the structure to say. Therefore, a place to reproduce on the rec/play application 1 is decided, Issue of Read File Command will perform "AV Address -> LBN conversion" (ST06 of drawing 64) within File System 2, and "LBN -> PSN conversion " (ST07) within Information Storage Division playback equipment 3.
[0415]The fractional elimination disposal method in AV file performs no treatment to the AV information currently recorded on the information storage medium, as shown in drawing 65, Only change processing of the information about rewriting (ST09 of drawing 65) and UDF of File Entry information on File System 2 is performed. To and Unallocated Space Table 452 or Unallocated Space Bitmap435 information which is non-record section information on UDF in order to register the place which carried out fractional elimination as a non-record section. The above-mentioned fractional elimination place is added (ST10). Rewriting processing of the management information to a recording video management data file is performed at the last (ST11).
[0416]It is attached to the method of recording and managing deficiency management information and free-space information combining the above-mentioned method as other working example of this invention, and explains.
[0417]VOB#2 which is the data size of a small quantity in Contiguous Data Area #beta 3602 in working example of drawing 66 Since additional recording of 3618 was carried out, Free-space Extent 3613 is set as the insufficiency in Contiguous Data Area #beta3602. When carrying out additional recording of video information or the AV information to AV File 3620 next time, record is started from the head position (LBN h+g and PSN place of k+g) of above-mentioned free-space Extent3613.
[0418]Although not illustrated, it is VOB#1 to the past. 3617 and VOB#2 VOB#3 existed among 3618 in the form over a part of Contiguous Data Area #alpha 3601 and Contiguous Data Area #beta3602. It follows on the fractional elimination of the VOB#3. Processing explained by drawing 40 to the portions of Contiguous Data Area #alpha 3601 and VOB#3 over Contiguous Data Area #beta 3602 is performed, Free-space Extent 3611 and free-space Extent 3612 were set up by the File System 2 side. At the

time of record of VOB#1, since the defect in the ECC block unit was discovered in "h+a" to "h+b-1", LBN set up there as defect region Extent 3609, without recording video information or AV information. In Contiguous Data Area #alpha 3601 and Contiguous Data Area #beta 3602, thus, record section Extent 3605, Defect region Extent 3609, record section . Although Extent 3606, free-space Extent 3611, free-space Extent 3612, record section Extent 3607, and free-space Extent 3613 are located in a line, it is considered that they are all a part of AV File 3620, All the Extent(s) are registered as Allocation Descriptors in File Entry of AV File 3620 so that explain and it may be in the drawing 66 bottom.

[0419]It does not have the defect management table collected independently as shown in TertiaryDefect Map (TDM) 3472 in a deficiency-management-information field (DMA) especially as a big feature in drawing 66, Only defect region Extent 3609 information registered into File Entry is deficiency management information. The attribute identification information of each Extent in AllocationDescriptors in File Entry of AV File 3620 is recorded in Implementation Use 3528 shown in drawing 67 (f). Namely, in drawing 67, the recording mode of Long Allocation Descriptor is adopted as a describing method of Allocation Descriptors, " Extent of a record section" is expressed as a value of Implementation Use 3528 at the time of "0 h", and " Extent of a defect region" is meant at the time of " Extent of a free space", and "Fh" at the time of "Ah." On the formal standard of UDF, although 6 bytes is to describe ImplementationUse 3528, it is taken as expression of 4 bits of low ranks by drawing 67 for simplification of explanation. In drawing 66, LBN and PSN are set up and a defect region and a free space serve as a value which carried out parallel translation of all of LBN and the PSN. That is, the feature of this invention working example is in the place which a jump of LBN to PSN does not generate so that it may produce as a result of Linear Replacement processing. AV Address is given only to the part where record section Extent 3605, 3606, and 3607 exists. As opposed to all the sectors excluding [this AV Address] defect region Extent 3609 in AVFile3620, and free-space Extent 3611, 3612, and 3613. It is the appearance to which the number was set in order according to the order of description of Allocation Descriptors described in File Entry. LBN of the sector of the beginning of record section Extent 3605 Namely, "h", PSN is "k", AV Address is set as "0", "h+f" and PSN of LBN of the sector of the beginning of record section Extent 3607 are "k+f", and AV Address serves as "a+c-b."

[0420]To the DVD-RAM disk, information is recorded by 502 units of ECC blocks. Therefore, it is exactly managed by the File System 2 side so that it may be recorded per ECC block also by drawing 66 of this invention working example. That is, File System 2

is controlling to be able to record an ECC block unit by Extent setting out. It is set up so that all of "a", "b", "d", "e", and "j" of drawing 66 may become "a multiple of 16", if concrete contents explain, It is set up so that the starting position of Contiguous Data Area #alpha 3601 and Contiguous Data Area #beta 3602 may turn into a head position in an ECC block and end position may turn into end position in an ECC block.

[0421]Since defective processing of the defect region is carried out per ECC block, a start and end position of defect region Extent 3609 are in agreement with the starting position and end position in an ECC block. Each VOB#1 in drawing 66 3616, 3617, and VOB#2 3618 sizes do not necessarily have the necessity of being recorded per 16 sectors, VOB#1 3616, 3617, and VOB#2 A part for the flash from the partial ECC block of 3618 is amended in free-space Extent 3611, 3612, and 3613 sizes.

[0422]The record method of the video information in working example shown in drawing 66 or AV information has also adopted the same record method as drawing 46. a uniquely different portion -- tertiary defect list [of / in the DMA field of ST4-01 in drawing 50]; -- record to Tertiary Defect List(TDL) 3414 becoming unnecessary and, Defective Extent3609 and free-space Extent 3611, 3612, and 3613 are added to Extent information on ST4-04.

[0423]Although "AVAddress -> LBN conversion -> PSN conversion " carries out in a reproduction procedure, The attribute of each Extent is detected from Allocation Descriptors in File Entry at the time of "AVAddress -> LBN conversion ", the object of reproduction of the record section Extent 3605, 3606, and 3607 -- carrying out (choice processing to defective Extent 3609 or the free space Extent 3611, 3612, and 3613) -- the big feature is in the place to perform.

[0424] Contiguous Data Area size and an ECC block border area place are considered at the time of Extent information rewriting processing (ST09) in File Entry of an AV file also at the time of the fractional elimination processing in a file. Suitably Insertion of free-space Extent is needed.

[0425]It is as follows when the focus of the system of above-mentioned this invention is summarized.

1. As shown in > drawing 33 (gamma) which a logical address is set up also to the defect region on < information storage medium, and avoids a defect region and sets up Extent, the 1st field that a user can record means User Area 723, PSN:Physical Sector Number which is a physical address which shows the physical position on an information storage medium in this User Area 723, LBN:Logical Block Number which is a logical address for managing logically the information recorded on an information storage medium is set up. The unit (in it, it has the logical address number (LBN) which continued mutually)

on which information was recorded succeeding said logical address space LBN space top as shown in drawing 29 (a) is called Extent, It is VOB#2 on each lump of Extent #alpha 3166, Extent #gamma 3168, and Extent #alpha 3166. 3162 and VOB#1 The information on 3161 is recorded.

[0426]When recording information on an information storage medium, a logical address is set up also to the defect region 3452 which is the place 3458 which is not recorded as shown in drawing 36 (gamma) (giving a logical address number (LBN)), After information is recorded on an information storage medium, as shown in drawing 41, Extent is divided between the Information Storage Division fields 3563 and 3564 and the defect region 3566, Extent #1 which is Extent for Information Storage Division only at the places 3563 and 3562 where said information was recorded 3571 and Extent #2 3572 and Extent #3 3573 is formed independently. Furthermore, only Extent for Information Storage Division is registered into File Entry.

[0427]Thus, setting out of Extent which avoided the defect region 3452 on File System is attained by setting up a logical address (LBN) to the defect region 3452. When Linear Replacement processing as shown in drawing 33 (beta) is performed, Since the place of the defect region 3455 is not known in File System 2 side. Even if it carries out access (LBN in drawing 33 (beta) is the continuous access from "a" to "a+47") to the logical address which continued by the File System 2 side, an optical head will take access time, as a result of performing a round trip of Spare Area 724. Since the logical address (LBN) is set up to the defect region 3452 compared with this like this invention of drawing 33 (gamma), processing for making the access frequency of an optical head propose by File System 2 side can be performed.

[0428]Since Extent which avoided and set up the defect region 3566 is set up on File Entry and it is, Without referring to the deficiency management information (TDM3472) shown in drawing 35 in File System 2 side, Since a place to reproduce directly according to the information recorded on File Entry can be accessed as shown in drawing 41 (d), processing on File System2 can also be performed easily.

2. When performing Skipping to a defect region at the time of < AV information record, and recording > information which avoids a defect region and carries out Extent setting out after the end of record, as it is shown in drawing 36 (gamma), Skipping Replacement processing which avoids the defect region 3452 on an information storage medium, and is recorded from the next is performed, as shown in ST04 of drawing 46, and ST4-04 of drawing 50, after the end of record, the above-mentioned defect region is avoided and Extent is set up.

[0429]It is separated from the place which records video information, and the place

where File Entry information is recorded on the information storage medium. Therefore, whenever it records slight video information, when Extent arrangement information is recorded, the access processing of an optical head is needed each time. The access frequency of the direction which stored Extent arrangement information temporarily in the semiconductor memory 219 of drawing 2, collected after the end of record of the whole video information like this invention to it, and rewrote File Entry information of an optical head decreases, and it becomes easy [the continuous recording of video information].

3. the optical head on the claim <which straddles a defect region and another file record section which already exists, and sets [ ] up Contiguous DataArea>, It corresponds to the optical head 202, the optical head moving mechanism (feed motor) 203 corresponds with the optical head moving mechanism to which said optical head is moved to an information storage medium, and it corresponds to the control section 220 of attached-materials Fig. 22 with the control section in a claim.

[0430]Information is recorded for every files, such as RWVIDEO.VOB shown in drawing 28, RWPICTURE.POB, and RWAUDIO.AOB. As shown in drawing 38, said file basis is constituted as an aggregate of Contiguous Data Area unit.

[0431]And it straddled in either one of another file record section already recorded on the information storage medium as shown in drawing 1 (d), or the defect region on an information storage medium, and Contiguous Data Area unit is set up.

[0432]The defect region 3566 is avoided like drawing 41 (e), and it is Extent #1. 3571, #23572, and #3 If 3573 is set up, After setting up, Linear Replacement processing may be performed at the LBN address place assigned to the defect region 3566, and PC file may enter it. When defect regions occur frequently on an information storage medium, a possibility that PC file will be dotted and recorded on a defect region in this way becomes large. The address in "Contiguous Data Area always continues as setups of Contiguous Data Area, If it defines [which cannot set up Contiguous Data Area"] Congiguous Data Area setups in not securing more than specification, Since PC file has already entered, it is Extent #1 of drawing 41 (e). 3571 and #2 3572 and #3 3573 is deleted, and even if it is going to record AV information again, reservation of Contiguous Data Area becomes impossible.

[0433]By adopting the setting method of Contiguous Data Area of this invention, Although PC file which performed Linear Replacement processing enters a defect region, Congiguous Data Area can be again set up after deletion of Extent, and effective use of the record section on an information storage medium is attained.

It is * by performing the numerical limitation of 4.5.6. Stabilization of the recording

processing by restricting reservation of the stable continuous recording conditions and the continuation size of * SkippingReplacement can be attained.

[0434]

[Effect of the Invention]As explained in full detail above, according to this invention, it is in providing the Information Storage Division playback equipment which performs the setting method of the recording place which can perform continuous recording stably, a record method, and it, without being influenced even if a lot of defect regions exist on an information storage medium. The information storage medium (and data structure of the information currently recorded there) with which information is recorded in the form which was most suitable for the continuous recording which carried out [above-mentioned] stability can be provided.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The explanatory view of the contiguous-data-area setting method in the 1 embodiment concerning this invention, and the extent presetting method before record.

[Drawing 2]The figure showing the outline composition of Information Storage Division playback equipment.

[Drawing 3]The composition explanatory view in the Information Storage Division regenerating section.

[Drawing 4]The explanatory view of the setting-operation of the logical block number in the Information Storage Division regenerating section.

[Drawing 5]The explanatory view of the defective part processing operation in the Information Storage Division regenerating section.

[Drawing 6]The explanatory view showing the relation of the address space treated on the hierarchy who writes it as the layered structure of the program software on the personal computer in the case of performing record reproduction processing of video information on a personal computer using recording playback application software.

[Drawing 7]The composition explanatory view of a personal computer.

[Drawing 8]The explanatory view of the layout of the contents of a line score in a DVD-RAM disk.

[Drawing 9]The explanatory view showing the composition in read in area in a DVD-RAM disk.

[Drawing 10]The explanatory view showing the composition in read out area in a

DVD-RAM disk.

[Drawing 11]The explanatory view showing the relation between a physical sector number and a logical sector number.

[Drawing 12]The explanatory view showing the signal structure in the sector recorded on a data area.

[Drawing 13]The explanatory view showing the record unit of the information recorded on a data area.

[Drawing 14]The explanatory view showing the zone in a data area, and a group's relation.

[Drawing 15]The explanatory view of the logical sector setting method in a DVD-RAM disk.

[Drawing 16]The explanatory view of the alternating processing method for the defect region in a data area.

[Drawing 17]The figure showing the example which recorded the file system on the information storage medium according to UDF.

[Drawing 18]The figure showing a continuation of drawing 17.

[Drawing 19]The figure showing briefly the fundamental relation between the structure of the hierarchized file system, and recorded information content to an information-storage-medium top.

[Drawing 20]The figure showing the example of the contents of the long allocation descriptor.

[Drawing 21]The figure showing the example of the contents of the short allocation descriptor.

[Drawing 22]The explanatory view of ********** of an ANROKEITEDO space entry.

[Drawing 23]The explanatory view showing a part of descriptive content of a file entry.

[Drawing 24]The explanatory view showing a part of descriptive content of a file identification descriptor.

[Drawing 25]The figure showing the example of a file system organization.

[Drawing 26]recording ·· the explanatory view of the data structure on a refreshable information storage medium.

[Drawing 27]The explanatory view of the data structure in AV file recorded on an information storage medium.

[Drawing 28]The explanatory view of the directory structure of the data file in a data area.

[Drawing 29]The figure showing the relation between the logical block number and AV address in AV file.

[Drawing 30]The key map of the recording system system shown in order to explain the continuity of a record signal.
[Drawing 31]The state explanatory view of the information conservative quantity in semiconductor memory when access frequency is the highest in a recording system.
[Drawing 32]The state explanatory view of the information conservative quantity in the semiconductor memory in the case of the ability to have balanced the video information record time and access time in the recording system.
[Drawing 33]The explanatory view for comparison with SUPIKKINGURIPUREI Smend in case Information Storage Division playback equipment manages deficiency management information, and a linear replacement.
[Drawing 34]The explanatory view of the data structure of the deficiency management information on the information storage medium which Information Storage Division playback equipment manages in each embodiment of this invention.
[Drawing 35]The explanatory view of the data structure of the deficiency management information on the information storage medium which the file system 2 manages in each embodiment of this invention.
[Drawing 36]The explanatory view for comparison with SUPIKKINGURIPUREI Smend at the time of being managed based on the deficiency management information of drawing 35, and a linear replacement.
[Drawing 37]The figure shown in order to explain other examples in case the file system 2 manages deficiency management information.
[Drawing 38]The explanatory view of the additional recording video information which each operation of this invention kicks, and a NO free space in contiguous day area.
[Drawing 39]The explanatory view of the recording place of information length specified for every file, and the attribute description part for every extent.
[Drawing 40]The explanatory view about the partial deletion method in AV file in each embodiment of this invention.
[Drawing 41]The explanatory view of the record method which avoided the defect region in one working example concerning this invention.
[Drawing 42]The explanatory view of other examples of the record method which avoided the defect region in one working example concerning this invention.
[Drawing 43]The explanatory view of a record method including the defect region in one working example concerning this invention.
[Drawing 44]The figure showing the outline composition of the Information Storage Division playback equipment concerning this invention.
[Drawing 45]The figure explaining the problem of a write command.

[Drawing 46]The figure showing the outline of the record procedure of the video information in this invention.
[Drawing 47]The figure showing the details of step ST01 of drawing 46.
[Drawing 48]The figure showing the details of step ST02 of drawing 46.
[Drawing 49]The figure showing the details of step ST03 of drawing 46.
[Drawing 50]The figure showing the details of step ST04 of drawing 46.
[Drawing 51]The figure showing the contents of various APICommand(s) used in an embodiment of the invention at the time of video information record.
[Drawing 52]The explanatory view showing the command over the Information Storage Division playback equipment concerning an embodiment of the invention.
[Drawing 53]The explanatory view showing the part where the identification information of AV file concerning this invention is recorded.
[Drawing 54]The explanatory view showing other examples of the part where the identification information of AV file concerning this invention is recorded.
[Drawing 55]The key map shown in order to explain the continuous recording method of the video information concerning this invention.
[Drawing 56]The explanatory view of the record method to the information storage medium by an embodiment of the invention.
[Drawing 57]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 58]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 59]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 60]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 61]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 62]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 63]The explanatory view of the record method to the information storage medium similarly according to an embodiment of the invention.
[Drawing 64]The figure showing the reproduction procedure of the video information concerning this invention.
[Drawing 65]The figure showing the procedure of the fractional elimination in AV file concerning this invention.

[Drawing 66]The explanatory view of the video information record method by other embodiments of this invention.

[Drawing 67]The explanatory view of the Extent attribute identification information record method by other embodiments of this invention.

[Description of Notations]

100 [-- Spare area, 3443, 3444 / -- A record section, 3452 / -- A defect region, 3456 / -- An alternative area, 3459 / -- Non recording field.] -- An optical disc, 1004 -- A data area, 723 -- User area, 724